

Universal gas constant,  $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$   
 Avogadro Constant  $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$

1. A certain sample of CO has only  $^{14}\text{C}_6$  and  $^{16}\text{O}_8$  isotopes. Another sample of CO has  $^{12}\text{C}_6$  and  $^{18}\text{O}_8$  isotopes only. The property that shows a significant difference between the two samples is
  - (1) chemical reactivity.
  - (2) molar mass.
  - (3) molar volume.
  - (4) density at S.T.P.
  - (5) percentage compositions of C and O by mass.
  
2. W, X, Y and Z are four non transition elements with consecutive atomic numbers. The first ionization enthalpies of W, X and Y are in the order  $W < X < Y$ . The oxide formed by Z is basic. The electronic configuration of the outermost shell of Z is of the type
 

(1) $ns^1 np^0$	(2) $ns^2 np^1$	(3) $ns^2 np^2$
(4) $ns^2 np^3$	(5) $ns^2 np^4$	
  
3. The element with the highest first ionization enthalpy out of the following is
 

(1) C	(2) N	(3) Si	(4) O	(5) P
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4. Which is the smallest ion out of the following ions in the gaseous state?
 

(1) $\text{O}^{2-}$	(2) $\text{F}^-$	(3) $\text{Na}^+$	(4) $\text{Mg}^{2+}$	(5) $\text{N}^{3-}$
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5. The electronic configuration of the valence shell of the element that has the least tendency to form a diatomic molecule is
 

(1) $s^1 p^0$	(2) $s^2 p^0$	(3) $s^2 p^3$
(4) $s^2 p^4$	(5) $s^2 p^5$	
  
6. Which of the following statements is correct regarding the atomic emission spectrum of hydrogen?
  - (1) The radiation corresponding to the  $n = 2$  to  $n = 1$  transition has the longest wavelength.
  - (2) The  $n = 3$  to  $n = 2$  transition corresponds to the  $H_\alpha$  line.
  - (3) The first series of lines (Lyman) occurs in the infra-red region.
  - (4) In a given series, the separation between adjacent lines increases in the direction of increasing energy.
  - (5) Emission of radiation occurs when electrons undergo transition to higher levels from lower levels.
  
7. In the reaction between  $\text{Cr}_2\text{O}_7^{2-}$  and  $\text{H}_2\text{O}_2$  in an acidic medium,  $\text{H}_2\text{O}_2$  is oxidised to  $\text{O}_2$  and  $\text{Cr}_2\text{O}_7^{2-}$  is converted to  $\text{Cr}^{3+}$ . The correct equation for this reaction is
  - (1)  $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + \text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 5\text{H}_2\text{O} + \text{O}_2$  ✗
  - (2)  $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + 3\text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{O}_2$  ✓
  - (3)  $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + 5\text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 9\text{H}_2\text{O} + 5\text{O}_2$  ✗
  - (4)  $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + 7\text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 11\text{H}_2\text{O} + 7\text{O}_2$  ✗
  - (5)  $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + 9\text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 13\text{H}_2\text{O} + 9\text{O}_2$  ✓
  
8. The ion/molecule which has a shape significantly different from the  $\text{SO}_4^{2-}$  ion is
 

(1) $\text{NH}_4^+$	(2) $\text{BCl}_4^-$	(3) $\text{SF}_4$	(4) $\text{S}_2\text{O}_3^{2-}$	(5) $\text{CH}_4$
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9. The products of dissociation of  $\text{HOBr}$  are most **unlikely** to be  
isotopes (1)  $\text{H}^+$  and  $\text{OBr}^-$  (2)  $\text{OH}^-$  and  $\text{Br}^+$  (3)  $\text{HO}^+$  and  $\text{Br}^-$   
(4)  $\text{HO}^-$  and  $\text{Br}$  (5)  $\text{H}^-$  and  $\text{OBr}$
10. A white inorganic salt was dissolved in dilute  $\text{HCl}$ . This solution when basified with excess  $\text{NH}_4\text{OH}$ , gave a colourless clear solution. One part of this solution when treated with  $\text{H}_2\text{S}$  gave a white precipitate. The other part of the solution, when treated with aqueous  $\text{Ba}(\text{OH})_2$ , also gave a white precipitate. The salt is  
alpies (1)  $\text{ZnCl}_2$  (2)  $\text{AlCl}_3$  (3)  $\text{MgSO}_4$   
ration (4)  $\text{ZnSO}_4$  (5)  $\text{NaAlO}_2$
11. 5.0 g of the anhydrous chloride of a monovalent metal when completely converted to its anhydrous sulphate, gave 6.0 g of the anhydrous sulphate. ( $\text{H} = 1$ ;  $\text{Cl} = 35.5$ ;  $\text{S} = 32$ ,  $\text{O} = 16$ )  
The relative atomic mass of the metal is  
(1) 20 (2) 24 (3) 27  
(4) 35 (5) 43
12. A, B, C are three cations which form precipitates with  $\text{NH}_4\text{OH}$ . These precipitates are soluble in excess  $\text{NH}_4\text{OH}$ . A, B, C are  
omi (1)  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cr}^{3+}$   
(2)  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Al}^{3+}$   
(3)  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ni}^{2+}$   
(4)  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cr}^{3+}$   
(5)  $\text{Ag}^+$ ,  $\text{Zn}^{2+}$ ,  $\text{Al}^{3+}$
13. The molar ratio  $\text{NaOH} : \text{Na}_2\text{CO}_3$  in an aqueous solution of  $\text{NaOH}$  and  $\text{Na}_2\text{CO}_3$  is 1 : 2. When 25.00 cm<sup>3</sup> of this solution is titrated with 0.1 mol dm<sup>-3</sup>  $\text{HCl}$  with phenolphthalein as indicator, the end point is 15.00 cm<sup>3</sup>. When the same titration is repeated using methyl orange instead of phenolphthalein as indicator, the end point (cm<sup>3</sup>) is  
rgy. (1) 15.00 (2) 20.00 (3) 25.00  
rels. (4) 30.00 (5) 40.00
14. The solubility of  $\text{KNO}_3$  in water at 25°C is 300 g per kilogramme of water. If a hot solution containing 540 g  $\text{KNO}_3$  in 600 g water is cooled the maximum mass of  $\text{KNO}_3$  that would crystallise out of the solution at 25°C is  
rted (1) 40 g (2) 180 g (3) 240 g  
(4) 360 g (5) 540 g
15. The number of moles of ions present in a solution made by mixing 125 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup>  $\text{NaOH}$  and 125 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup>  $\text{H}_2\text{SO}_4$  is  
(1) 0.0375 (2) 0.0625 (3) 0.0875  
(4) 0.15 (5) 0.30
16. Which one of the following chlorides in 1.0 mol dm<sup>-3</sup> aqueous solution shows the highest pH value?  
(1)  $\text{AlCl}_3$  (2)  $\text{HCl}$  (3)  $\text{PCl}_3$   
(4)  $\text{MgCl}_2$  (5)  $\text{NH}_4\text{Cl}$
17. Acidified  $\text{MnO}_4^-$  reacts with  $\text{H}_2\text{O}_2$  producing  $\text{O}_2$ ,  $\text{Mn}^{2+}$  and  $\text{H}_2\text{O}$  only. The number of moles of  $\text{MnO}_4^-$  required for the complete reaction of one mole of  $\text{H}_2\text{O}_2$  in an acidified medium is  
(1) 0.4 (2) 0.8 (3) 2.0  
(4) 2.5 (5) 5.0

[see page four

18. A dilute HCl solution of salt A
- is colourless.
  - gives an orange precipitate with  $H_2S$ , and
  - forms a white precipitate when added to water

The cation contained in salt A is

- (1)  $Cd^{2+}$       (2)  $Sb^{3+}$       (3)  $Pb^{2+}$       (4)  $Bi^{3+}$       (5)  $Sn^{2+}$

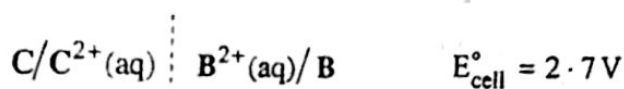
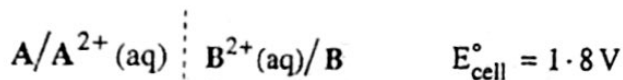
19. Which one of the following would represent the formation of covalent bonds?

- (1) A non-metal taking electrons from a metal  
 (2) A non-metal taking electrons from another non-metal  
 (3) A metal giving a pair of electrons to a non-metal  
 (4) A non-metal giving a pair of electrons to a metal  
 (5) A metal and non-metal sharing electrons

20. At a temperature of  $27^\circ C$  and a pressure of  $10^5$  Pa, air contains 21% by volume of oxygen.  $10\text{ m}^3$  of this air is compressed to  $1\text{ m}^3$  at the same temperature. The partial pressure of oxygen in the compressed air is (in units of Pa)

- (1)  $1.0 \times 10^4$       (2)  $2.1 \times 10^4$       (3)  $2.1 \times 10^5$       (4)  $1.0 \times 10^6$       (5)  $21 \times 10^5$

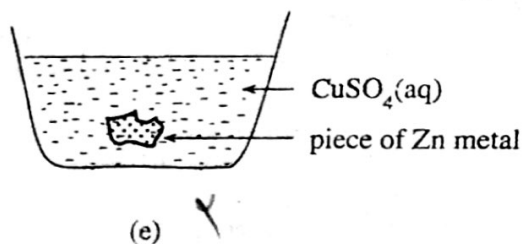
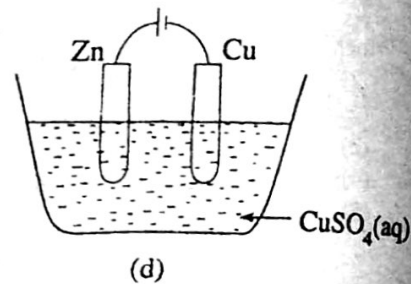
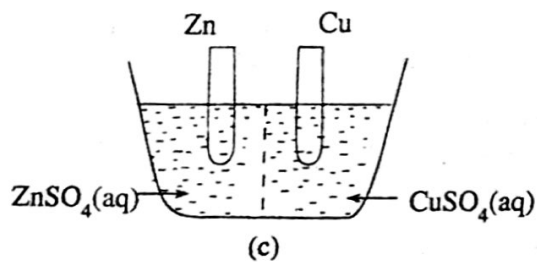
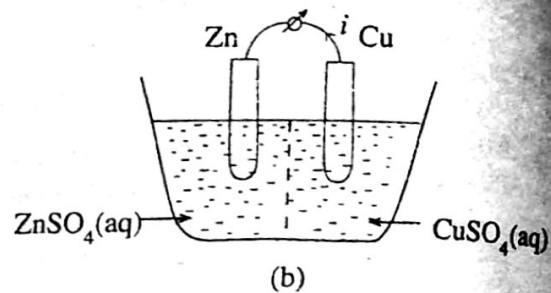
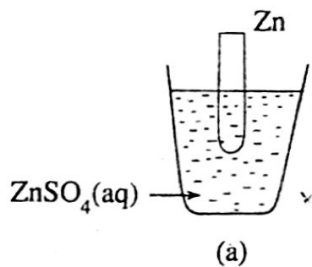
21. At  $25^\circ C$ , the standard cell e.m.f. ( $E^\circ_{\text{cell}}$ ) values for two electrochemical cells are given below :



Which one of the following is true for the cell with  $A^{2+}(\text{aq})/A$  and  $C^{2+}(\text{aq})/C$  as electrodes at  $25^\circ C$ ?

- (1)  $E^\circ_{\text{cell}} = 4.5\text{ V}$  ; C electrode negative  
 (2)  $E^\circ_{\text{cell}} = 4.5\text{ V}$  ; A electrode negative  
 (3)  $E^\circ_{\text{cell}} = 0.9\text{ V}$  ; C electrode negative  
 (4)  $E^\circ_{\text{cell}} = 0.9\text{ V}$  ; A electrode negative  
 (5)  $E^\circ_{\text{cell}} = -0.9\text{ V}$  ; C electrode negative

22. Consider the following systems (a) to (e)



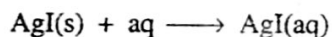
Which of the following pairs can be considered equilibrium systems?

- (1) (a) and (b)    (2) (b) and (c)    (3) (a) and (c)    (4) (d) and (e)    (5) (c) and (e)

23. The following thermochemical data is available in units of  $\text{kJ mol}^{-1}$  :

Lattice enthalpy of $\text{AgI (s)}$	= -876
Standard hydration enthalpy of $\text{Ag}^+(\text{g})$	= -464
Standard hydration enthalpy of $\text{I}^-(\text{g})$	= -293

The standard enthalpy of solution of  $\text{AgI(s)}$  in water as represented by



in units of  $\text{kJ mol}^{-1}$  is

- (1) +238    (2) +119    (3) -119    (4) -1633    (5) +1633

24. In a particular reaction involving two reactants P and Q, experimental data obtained at 353 K are given below

Initial concentration of P/mol $\text{dm}^{-3}$	Initial concentration of Q/mol $\text{dm}^{-3}$	Initial reaction rate / mol $\text{dm}^{-3} \text{ minute}^{-1}$
$3.2 \times 10^{-3}$	$2.5 \times 10^{-2}$	$1.74 \times 10^{-5}$
$3.2 \times 10^{-3}$	$5.0 \times 10^{-2}$	$3.48 \times 10^{-5}$
$1.6 \times 10^{-3}$	$2.5 \times 10^{-2}$	$8.70 \times 10^{-6}$

The relevant rate equation for the reaction is

- (1) rate  $\propto$  [P]    (2) rate  $\propto$  [Q]    (3) rate  $\propto$  [P][Q]  
 (4) rate  $\propto$  [P][Q]<sup>2</sup>    (5) rate  $\propto$  [P]<sup>2</sup>[Q]

● Questions 25 and 26 refer to the following data :

One gas bulb contains gas A and another gas bulb contains gas B. Both gas bulbs are at the same temperature. The density of gas A is half that of gas B. The mean square speed of gas B is twice the mean square speed of gas A. Pressure of gas A = 1000 kPa .

25. The pressure of gas B in kPa is

- (1) 4000    (2) 2000    (3) 1000    (4) 500    (5) 250

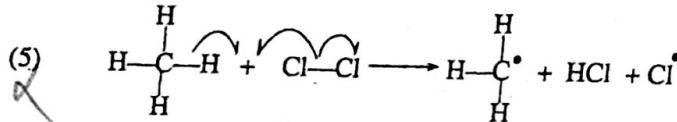
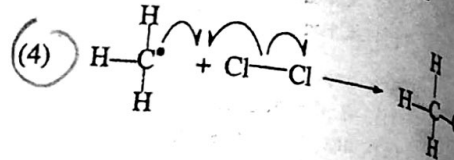
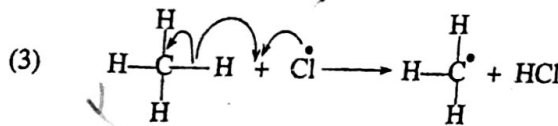
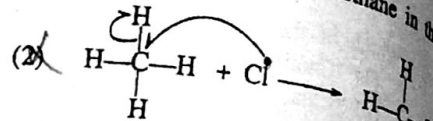
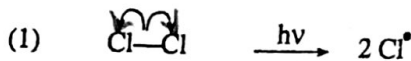
26. If the volumes of the two gas bulbs are the same, the ratio of the number of molecules of gas A : number of molecules of gas B is

- (1) 4 : 1    (2) 2 : 1    (3) 1 : 1    (4) 1 : 2    (5) 1 : 4

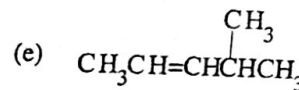
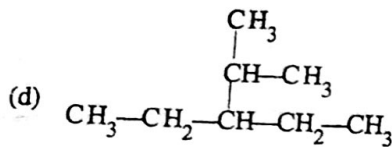
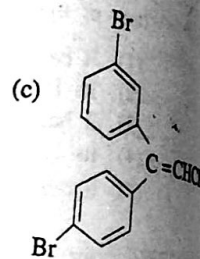
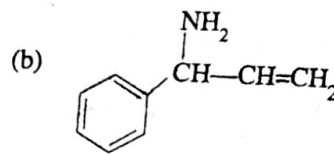
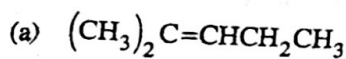
[see page six]

27. Which of the following is **not** a characteristic of catalysts?
- (1) Catalysts are chemically unchanged at the end of the reaction
  - (2) Catalysts are specific in action
  - (3) Catalysts reduce the enthalpy change accompanying a reaction
  - (4) Catalysts provide an alternative route for a reaction
  - (5) Catalysts lower the activation energy barrier of a reaction
28. Which one of the following polymers,
- (i) is thermoplastic,
  - (ii) has no cross-links and
  - (iii) is a product of addition polymerisation?
- (1) Nylon
  - (2) Polyester
  - (3) Polyvinyl chloride
  - (4) Urea-formaldehyde
  - (5) Vulcanised rubber
29. Which of the following statements is correct regarding  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ ?
- (1) It has only co-ordinate and covalent bonds.
  - (2) Its IUPAC name is pentamminechlorocobalt(II) chloride.
  - (3) It has co-ordinate, covalent and ionic bonds.
  - (4) Its IUPAC name is pentamminechlorocobalt(III) dichloride.
  - (5) It does not give a precipitate with aqueous  $\text{AgNO}_3$ .
30. Which one of the following compounds reacts with  $\text{H}_2\text{S}$  in acidic solution and does **not** produce sulphur as one of the products?
- (1)  $\text{FeCl}_3$
  - (2)  $\text{Na}_3\text{AsO}_4$
  - (3)  $\text{NaAsO}_2$
  - (4)  $\text{K}_2\text{CrO}_4$
  - (5)  $\text{Na}_2\text{SO}_3$
31. The standard enthalpies of combustion ( $\text{kJ mol}^{-1}$ ) of gaseous acetylene and liquid benzene at  $25^\circ\text{C}$  are  $x$  and  $y$  respectively.  
The standard enthalpy change ( $\text{kJ mol}^{-1}$ ) for the reaction
- $$3 \text{C}_2\text{H}_2(\text{g}) \rightleftharpoons \text{C}_6\text{H}_6(\text{l}) \text{ is}$$
- (1)  $3(y - x)$
  - (2)  $3y - x$
  - (3)  $3x - y$
  - (4)  $y - 3x$
  - (5)  $x - 3y$
32. The IUPAC name of the compound
- $$\text{HO}-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\text{CH}_2}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_3 \text{ is}$$
- (1) 4-ethyl-3-oxopent-4-en-1-ol.
  - (2) 2-ethyl-5-hydroxy-3-oxo-pent-1-ene
  - (3) 4-ethyl-1-hydroxypent-4-en-3-one
  - (4) 2-ethyl-5-hydroxypent-1-en-3-one
  - (5) 2-ethyl-1-ene-5-hydroxy-3-pentanone
33. Which of the following statements is **incorrect**?
- (1) Amides are less basic than ammonia.
  - (2) Phenol readily reacts with formaldehyde in an alkaline medium.
  - (3) Phenols are more acidic than alcohol.
  - (4) Phenol readily undergoes an addition reaction with  $\text{Br}_2/\text{H}_2\text{O}$  to give a white precipitate.
  - (5) Boiling points of carboxylic acids are higher than those of aldehydes with comparable relative molecular masses.

34. Which of the following most correctly depicts a step in the reaction of  $\text{Cl}_2$  with methane in the presence of sunlight?



35. Which of the following show stereo-isomerism?



(1) (a), (b) and (c),

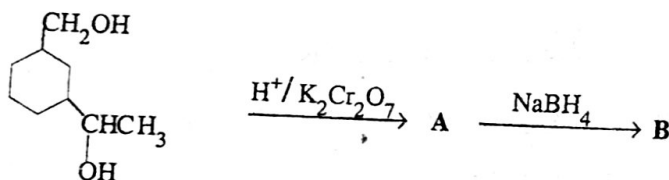
(2) (b), (c) and (d)

(4) (a), (c) and (d)

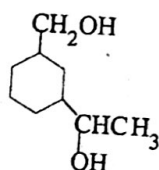
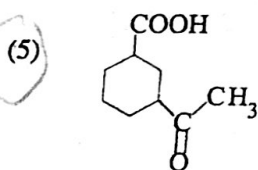
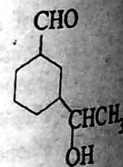
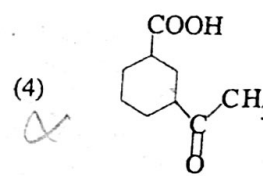
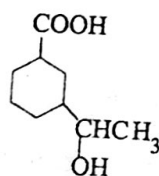
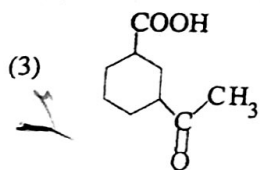
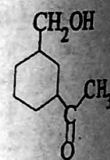
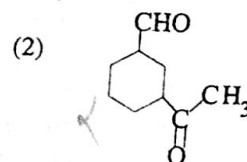
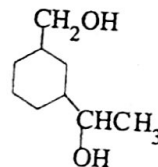
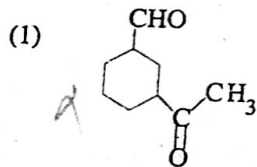
(5) (b), (c) and (e)

(3) (c), (d) and (e)

36. Consider the following reaction scheme.

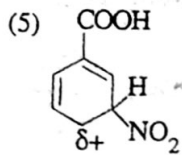
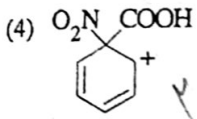
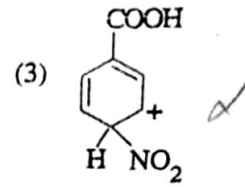
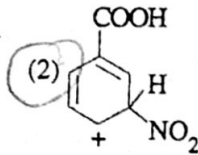
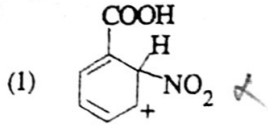


The most likely compounds corresponding to A and B respectively are :

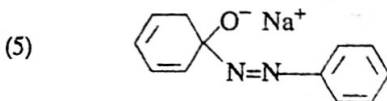
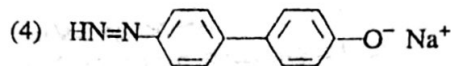
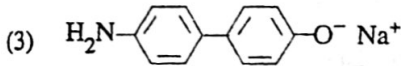
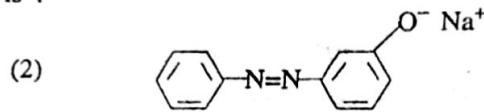
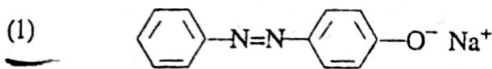


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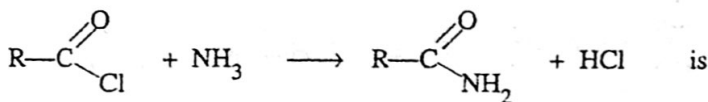
37. Nitration of benzoic acid is an electrophilic substitution reaction. The intermediate most likely to be formed during the reaction is :



38. When aniline is reacted with  $\text{NaNO}_2/\text{HCl}$  at  $5-10^\circ\text{C}$  and the reaction mixture obtained is added to a solution of phenol in aqueous  $\text{NaOH}$ , the major product formed is :



39. The reaction,



(1) an electrophilic substitution reaction.

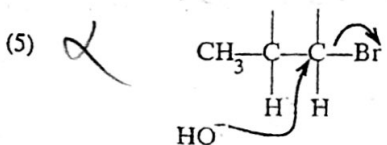
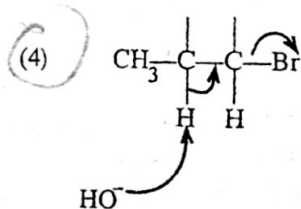
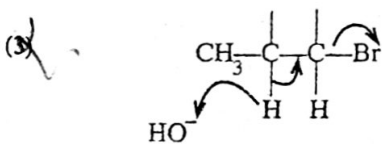
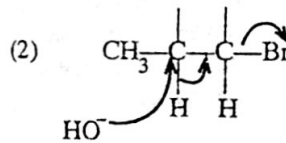
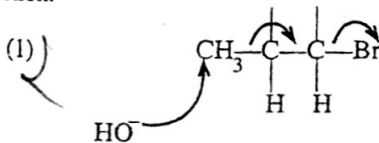
(2) an electrophilic addition reaction.

(3) a nucleophilic substitution reaction.

(4) a nucleophilic addition reaction.

(5) an elimination reaction.

40. Consider the reaction between alkyl halides and alcoholic  $\text{KOH}$ , which produces alkenes. Using your knowledge of principles of reaction mechanisms, select which of the following correctly depicts the mechanism of this reaction.



● Instructions for question No. 41 to 50

For each of the questions 41 to 50, four responses (a), (b), (c) and (d) are given. One or more of these is/are correct. Select the correct response/responses. In accordance with the instructions given on your answer sheet mark

- (1) if only (a) and (b) are correct.
- (2) if only (b) and (c) are correct.
- (3) if only (c) and (d) are correct.
- (4) if only (d) and (a) are correct.
- (5) if any other number or combination of responses is/are correct.

Summary of above Instructions				
(1)	(2)	(3)	(4)	(5)
Only (a) and (b) correct	Only (b) and (c) correct	Only (c) and (d) correct	Only (d) and (a) correct	any other number or combination of responses correct

41. In which of the following groups of compounds / ions do all members of the group have nearly the same colour?
- (a) CdS, AgI,  $K_2CrO_4$  (b)  $[Co(NH_3)_6]^{2+}$ ,  $[Ni(NH_3)_6]^{2+}$ ,  $[CoCl_4]^{2-}$   
 (c) CuS, NiS, ZnS (d)  $CuCl_2$ ,  $NiCl_2$ ,  $MnCl_2$
42. Which of the following statement(s) is/are true regarding calcium carbide?
- (a) It can be produced by heating CaO and carbon.  
 (b) It is used in the commercial manufacture of bleaching powder.  
 (c) It is used as a fertilizer.  
 (d) It decolorises aqueous  $KMnO_4$ .
43. Which of the following statement(s) is/are true regarding air?
- (a) It contains more  $H_2$  than Ar.  
 (b) It contains, approximately, 78 mole percent of  $N_2$  and 21 mole percent of  $O_2$ .  
 (c) It contains more Ar than  $CO_2$ .  
 (d) It contains more He than Ar.
44. By treating industrial waste water with  $OCI^-$  in alkaline medium, cyanide ions in waste water are converted to  $N_2$  and carbonate ions according to the following equation.
- $$2 CN^- + 5 OCI^- + 2 OH^- \longrightarrow 2 CO_3^{2-} + N_2 + 5 Cl^- + H_2O$$
- Which of the following statement(s) is/are true regarding this reaction?
- (a) Oxidation number of oxygen in  $OCI^-$  is changed from 0 to -2.  
 (b) Oxidation number of carbon is changed from +2 to +4.  
 (c) Oxidation number of nitrogen is changed from -3 to 0.  
 (d) Oxidation number of chlorine is changed from +1 to -1.
45. Which of the following may be used to distinguish between  $SO_2$  and  $CO_2$ ?
- (a) A solution of  $Ba(OH)_2$  (b) A filter paper moistened with lead acetate  
 (c) A solution of  $K_2Cr_2O_7$  (d) A piece of red-coloured flower petal
46. Liquids A and B form ideal solutions with each other. One mole each of A and B are mixed in a bottle and the bottle is stoppered. The vapour pressures of pure A and pure B under the conditions of the experiment are 120 mm Hg and 140 mm Hg respectively. At equilibrium, the mole fractions of A and B in the liquid phase are  $X_A$  and  $X_B$  respectively; the mole fractions of A and B in the vapour phase are then  $Y_A$  and  $Y_B$  respectively.
- Which of the following expression(s) is/are true?
- (a)  $X_A = X_B$  (b)  $Y_B > Y_A$  (c)  $X_A > X_B$  (d)  $Y_A > Y_B$

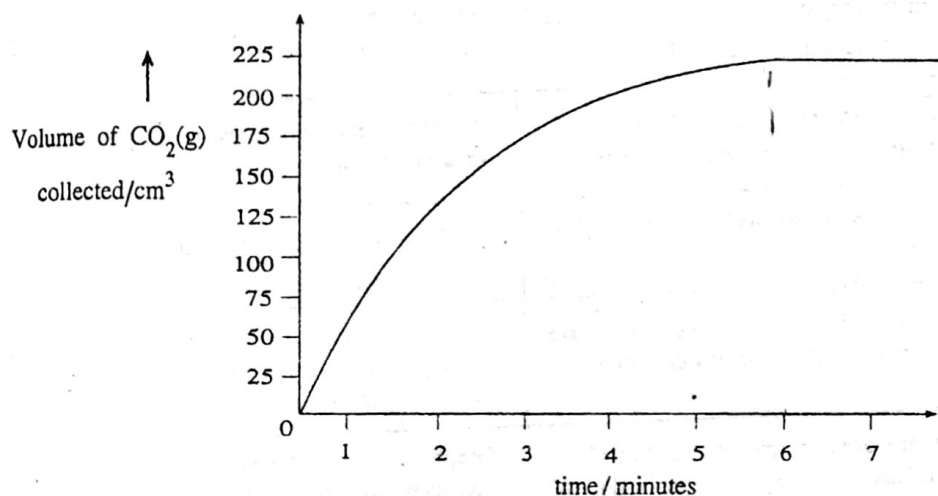
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47.  $\text{MX}$  and  $\text{NX}_2$  are ionic compounds of which the solubility products at 300 K are  $1 \times 10^{-8} \text{ mol}^2 \text{ dm}^{-6}$  and  $4 \times 10^{-12} \text{ mol}^3 \text{ dm}^{-9}$  respectively. Here,  $\text{M}$  is a univalent metal and  $\text{N}$  is a divalent metal.

Which of the following statement(s) is/are true regarding a saturated solution of  $\text{MX}$  (solution A) and a saturated solution of  $\text{NX}_2$  (Solution B) at 300 K?

- (a) Concentration of  $\text{M}^+$  in solution A is equal to the concentration of  $\text{N}^{2+}$  in solution B. ✓  
 (b) Concentration of  $\text{X}^-$  in solution A is twice the concentration of  $\text{X}^-$  in solution B. +  
 (c) Concentration of  $\text{N}^{2+}$  in solution B is twice the concentration of  $\text{M}^+$  in solution A. +  
 (d) Concentration of  $\text{X}^-$  in solution B is twice the concentration of  $\text{X}^-$  in solution A. ✓
48. 10 g of uniformly powdered  $\text{CaCO}_3$  (relative molecular mass = 100) was reacted with  $100 \text{ cm}^3$  of  $0.2 \text{ mol dm}^{-3}$   $\text{HCl}$  solution. When the volume of  $\text{CO}_2$  collected was plotted against time, the following graph was obtained:



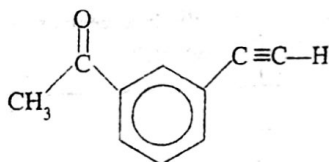
According to this graph

- (a) the rate at which  $\text{CO}_2(\text{g})$  is liberated decreases with time. ✓  
 (b) Approximately 6 minutes after starting the reaction, an equilibrium is reached. ✓  
 (c) the rate at which  $\text{CO}_2(\text{g})$  is liberated increases with time. ✗  
 (d) Approximately 6 minutes after starting the reaction, the concentrations of different species present in the solution become constant. ✗

49. Correct statement(s) regarding benzene is/are

- (a) benzene has six  $\pi$  electrons. ✓  
 (b) benzene readily undergoes reaction with nucleophiles. ✗  
 (c) benzene has three localized  $\pi$  bonds. ✗  
 (d) benzene characteristically undergoes substitution reactions. ✓

50. The compound,



- (a) gives a silver mirror with ammoniacal silver nitrate and an orange precipitate with Brady's reagent. ✗  
 (b) reacts with ammoniacal silver nitrate but does not give a silver mirror. ✓  
 (c) decolorises  $\text{Br}_2/\text{H}_2\text{O}$ . ✓  
 (d) does not react with ammoniacal silver nitrate. ✗

● Instructions for questions No. 51 to 60

In questions No. 51 to 60, two statements are given in respect of each question.

From the Table given below, select the response out of the responses (1), (2), (3), (4) and (5) that best describes the two statements given for each of the questions and mark appropriately on your answer sheet.

Response	First Statement	Second Statement
(1)	True	True, and correctly explains the first statement.
(2)	True	True, but does not explain the first statement correctly.
(3)	True	False
(4)	False	True
(5)	False	False

	First Statement	Second Statement
51.	The boiling point of propanone ( $M_r = 58$ ) is higher than that of 2-methylpropane ( $M_r = 58$ ). 3	Propanone molecules cannot form hydrogen bonds amongst themselves.
52.	Butan-2-ol gives a turbidity with conc. $\text{HCl}/\text{ZnCl}_2$ within a shorter time than does 2-methylpropan-2-ol.	Tertiary carbonium ions are more stable than secondary carbonium ions.
53.	Glucose is soluble in water while cholesterol is insoluble in water.	Cholesterol cannot form hydrogen bonds with water.
54.	Elements higher up in the electrochemical series are better reducing agents than those lower down. 2	An element lower in the electrochemical series can be displaced from a solution of its salt by an element higher up in the series.
55.	Graphite anodes are used in one of the electrolytic processes for the manufacture of caustic soda. 2	Graphite is a good electrical conductor and is not corroded by caustic soda.
56.	Water boiling in a kettle and its vapour form an equilibrium system. 2	At a constant external pressure, the temperature of any boiling liquid is a constant.
57.	$\text{CO}$ contains 0.430 g of carbon per gram of oxygen whereas $\text{CO}_2$ contains 0.215 g of carbon per gram of oxygen. ( $\text{C} = 12$ ; $\text{O} = 16$ ) 3	If two elements can combine to form more than one compound, they do so in simple atomic ratios.
58.	Phosphorus is stored under water to prevent its reaction with atmospheric $\text{O}_2$ . 3	$\text{O}_2$ dissolved in water does not react with phosphorus.
59.	A $\text{Ni}^{2+}$ solution in dilute $\text{HCl}$ does not give a black precipitate of $\text{NiS}$ with $\text{H}_2\text{S}$ . 2	$\text{NiS}$ is easily soluble in dilute $\text{HCl}$ .
60.	The pH of a $0.01 \text{ mol dm}^{-3}$ solution of $\text{H}_2\text{SO}_4$ is lower than that of a $0.01 \text{ mol dm}^{-3}$ solution of $\text{HCl}$ .	In dilute aqueous solutions, $\text{H}_2\text{SO}_4$ is a stronger acid than $\text{HCl}$ .

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