

## CHEMISTRY

1. Which of the following is not an ore of magnesium ?
- 1) Carnallite
  - 2) Dolomite
  - 3) Calamine
  - 4) Sea water
2. The atomic numbers of *Ni* and *Cu* are 28 and 29 respectively. The electron configuration  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$  represents
- 1)  $Cu^+$
  - 2)  $Cu^{2+}$
  - 3)  $Ni^{2+}$
  - 4) *Ni*
3. In the following, the element with the highest ionisation energy is
- 1)  $[Ne]3s^2 3p^1$
  - 2)  $[Ne]3s^2 3p^3$
  - 3)  $[Ne]3s^2 3p^2$
  - 4)  $[Ne]3s^2 3p^4$
4. In the conversion of  $Br_2$  to  $BrO_3^-$ , the oxidation number of *Br* changes from
- 1) zero to + 5
  - 2) + 1 to + 5
  - 3) zero to - 3
  - 4) + 2 to + 5
5. Among the alkali metals cesium is the most reactive because
- 1) its incomplete shell is nearest to the nucleus
  - 2) it has a single electron in the valence shell
  - 3) it is the heaviest alkali metal
  - 4) the outermost electron is more loosely bound than the outermost electron of the other alkali metals.

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16.  $\Delta G^\circ$  Vs  $T$  plot in the Ellingham's diagram slopes downwards for the reaction
- 1)  $Mg + \frac{1}{2}O_2 \rightarrow MgO$
  - 2)  $2Ag + \frac{1}{2}O_2 \rightarrow Ag_2O$
  - 3)  $C + \frac{1}{2}O_2 \rightarrow CO$
  - 4)  $CO + \frac{1}{2}O_2 \rightarrow CO_2$
17. Which of the following reaction taking place in the Blast furnace is endothermic ?
- 1)  $CaCO_3 \rightarrow CaO + CO_2$
  - 2)  $2C + O_2 \rightarrow 2CO$
  - 3)  $C + O_2 \rightarrow CO_2$
  - 4)  $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
18. Liquor ammonia bottles are opened only after cooling. This is because
- 1) it is a mild explosive
  - 2) it is a corrosive liquid
  - 3) it is a lachrymatory
  - 4) it generates high vapour pressure
19. The formation of  $O_2^+ [Pt F_6]^-$  is the basis for the formation of Xenon fluorides. This is because
- 1)  $O_2$  and  $Xe$  have comparable sizes
  - 2) both  $O_2$  and  $Xe$  are gases
  - 3)  $O_2$  and  $Xe$  have comparable ionisation energies
  - 4)  $O_2$  and  $Xe$  have comparable electronegativities
20. The highest magnetic moment is shown by the transition metal ion with the configuration
- 1)  $3d^2$
  - 2)  $3d^5$
  - 3)  $3d^7$
  - 4)  $3d^9$

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21. A transition metal ion exists in its highest oxidation state. It is expected to behave as
- 1) a chelating agent
  - 2) a central metal in a coordination compound
  - 3) an oxidising agent
  - 4) a reducing agent
22. In which of the following complex ion, the central metal ion is in a state of  $sp^3d^2$  hybridisation?
- 1)  $[CoF_6]^{3-}$
  - 2)  $[Co(NH_3)_6]^{3+}$
  - 3)  $[Fe(CN)_6]^{3-}$
  - 4)  $[Cr(NH_3)_6]^{3+}$
23. Which of the following can participate in linkage isomerism?
- 1)  $NO_2^-$
  - 2)  $H_2NCH_2CH_2NH_2$
  - 3)  $H_2O$
  - 4)  $:NH_3$
24. Which of the following has the highest bond order?
- 1)  $N_2$
  - 2)  $O_2$
  - 3)  $He_2$
  - 4)  $H_2$
25. Which of the following is diamagnetic?
- 1)  $H_2^+$
  - 2)  $O_2$
  - 3)  $Li_2$
  - 4)  $He_2^+$

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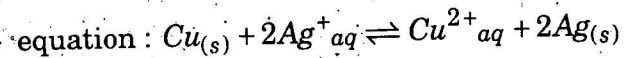
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26. The concentration of a reactant  $X$  decreases from  $0.1\text{ M}$  to  $0.025\text{ M}$  in 40 minutes. If the reaction follows I order kinetics, the rate of the reaction when the concentration of  $X$  is  $0.01\text{ M}$  will be
- 1)  $1.73 \times 10^{-4}\text{ M min}^{-1}$                       2)  $3.47 \times 10^{-4}\text{ M min}^{-1}$   
3)  $3.47 \times 10^{-5}\text{ M min}^{-1}$                       4)  $1.73 \times 10^{-5}\text{ M min}^{-1}$
27. Chemical reactions with very high  $E_a$  values are generally
- 1) very fast                                      2) very slow  
3) moderately fast                              4) spontaneous
28. Which of the following does not conduct electricity ?
- 1) fused  $\text{NaCl}$                                       2) solid  $\text{NaCl}$   
3) brine solution                                      4) Copper
29. When a quantity of electricity is passed through  $\text{CuSO}_4$  solution,  $0.16\text{ g}$  of Copper gets deposited. If the same quantity of electricity is passed through acidulated water, then the volume of  $\text{H}_2$  liberated at STP will be [Given At. Wt.  $\text{Cu} = 64$ ]
- 1)  $4.0\text{ cm}^3$                                       2)  $56\text{ cm}^3$   
3)  $604\text{ cm}^3$                                       4)  $8.0\text{ cm}^3$
30. Solubility product of a salt  $\text{AB}$  is  $1 \times 10^{-8}\text{ M}^2$  in a solution in which the concentration of  $\text{A}^+$  ions is  $10^{-3}\text{ M}$ . The salt will precipitate when the concentration of  $\text{B}^-$  ions is kept
- 1) between  $10^{-8}\text{ M}$  to  $10^{-7}\text{ M}$                       2) between  $10^{-7}\text{ M}$  to  $10^{-6}\text{ M}$   
3)  $> 10^{-5}\text{ M}$                                       4)  $< 10^{-8}\text{ M}$

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31. Which one of the following condition will increase the voltage of the cell represented by the



- 1) increase in the dimensions of  $\text{Cu}$  electrode
- 2) increase in the dimensions of  $\text{Ag}$  electrode
- 3) increase in the concentration of  $\text{Cu}^{2+}$  ions
- 4) increase in the concentration of  $\text{Ag}^+$  ions

32. The pH of  $10^{-8}$  M  $\text{HCl}$  solution is

- 1) 8
- 2) more than 8
- 3) between 6 and 7
- 4) slightly more than 7

33. The mass of glucose that should be dissolved in 50 g of water in order to produce the same lowering of vapour pressure as is produced by dissolving 1 g of urea in the same quantity of water is

- 1) 1 g
- 2) 3 g
- 3) 6 g
- 4) 18 g

34. Osmotic pressure observed when benzoic acid is dissolved in benzene is less than that expected from theoretical considerations. This is because

- 1) benzoic acid is an organic solute
- 2) benzoic acid has higher molar mass than benzene
- 3) benzoic acid gets associated in benzene
- 4) benzoic acid gets dissociated in benzene

35. For a reaction to be spontaneous at all temperatures

- 1)  $\Delta G$  and  $\Delta H$  should be negative
- 2)  $\Delta G$  and  $\Delta H$  should be positive
- 3)  $\Delta G = \Delta S = 0$
- 4)  $\Delta H < \Delta G$

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36. Which of the following electrolyte will have maximum flocculation value for  $Fe(OH)_3$  sol. ?
- 1)  $NaCl$
  - 2)  $Na_2S$
  - 3)  $(NH_4)_3PO_4$
  - 4)  $K_2SO_4$
37. For a reversible reaction :  $X_{(g)} + 3Y_{(g)} \rightleftharpoons 2Z_{(g)}$   
 $\Delta H = -40 \text{ kJ}$  the standard entropies of  $X$ ,  $Y$  and  $Z$  are 60, 40 and  $50 \text{ JK}^{-1} \text{ mol}^{-1}$  respectively.  
The temperature at which the above reaction attains equilibrium is about
- 1) 400 K
  - 2) 500 K
  - 3) 273 K
  - 4) 373 K
38. The radii of  $Na^+$  and  $Cl^-$  ions are 95 pm and 181 pm respectively. The edge length of  $NaCl$  unit cell is
- 1) 276 pm
  - 2) 138 pm
  - 3) 552 pm
  - 4) 415 pm
39. Inductive effect involves
- 1) displacement of  $\sigma$  electrons
  - 2) delocalisation of  $\pi$  electrons
  - 3) delocalisation of  $\sigma$  electrons
  - 4) displacement of  $\pi$  electrons
40. The basicity of aniline is less than that of cyclohexylamine. This is due to
- 1) +R effect of  $-NH_2$  group
  - 2) -I effect of  $-NH_2$  group
  - 3) -R effect of  $-NH_2$  group
  - 4) hyperconjugation effect

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46. Which of the following compound would not evolve  $CO_2$  when treated with  $NaHCO_3$  solution ?
- 1) salicylic acid
  - 2) phenol
  - 3) benzoic acid
  - 4) 4-nitro benzoic acid
47. By heating phenol with chloroform in alkali, it is converted into
- 1) salicylic acid
  - 2) salicylaldehyde
  - 3) anisole
  - 4) phenyl benzoate
48. When a mixture of calcium benzoate and calcium acetate is dry distilled, the resulting compound is
- 1) acetophenone
  - 2) benzaldehyde
  - 3) benzophenone
  - 4) acetaldehyde
49. Which of the following does not give benzoic acid on hydrolysis ?
- 1) phenyl cyanide
  - 2) benzoyl chloride
  - 3) benzyl chloride
  - 4) methyl benzoate
50. Which of the following would undergo Hoffmann reaction to give a primary amine ?

- $O$   
 $||$
- 1)  $R-C-Cl$
  - 2)  $RCONHCH_3$
  - 3)  $RCONH_2$
  - 4)  $RCOOR$

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51. Glucose contains in addition to aldehyde group
- 1) one secondary *OH* and four primary *OH* groups
  - 2) one primary *OH* and four secondary *OH* groups
  - 3) two primary *OH* and three secondary *OH* groups
  - 4) three primary *OH* and two secondary *OH* groups
52. A distinctive and characteristic functional group of fats is
- 1) a peptide group
  - 2) an ester group
  - 3) an alcoholic group
  - 4) a ketonic group
53. At pH = 4 glycine exists as
- 1)  $H_3N^+ - CH_2 - COO^-$
  - 2)  $H_3N^+ - CH_2 - COOH$
  - 3)  $H_2N - CH_2 - COOH$
  - 4)  $H_2N - CH_2 - COO^-$
54. Insulin regulates the metabolism of
- 1) minerals
  - 2) amino acids
  - 3) glucose
  - 4) vitamins
55. The formula mass of Mohr's salt is 392. The iron present in it is oxidised by  $KMnO_4$  in acid medium. The equivalent mass of Mohr's salt is
- 1) 392
  - 2) 31.6
  - 3) 278
  - 4) 156

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56. The brown ring test for nitrates depends on
- 1) the reduction of nitrate to nitric oxide
  - 2) oxidation of nitric oxide to nitrogen dioxide
  - 3) reduction of ferrous sulphate to iron
  - 4) oxidising action of sulphuric acid
57. Acrolein test is positive for
- 1) polysaccharides
  - 2) proteins
  - 3) oils and fats
  - 4) reducing sugars
58. An organic compound which produces a bluish green coloured flame on heating in presence of copper is
- 1) chlorobenzene
  - 2) benzaldehyde
  - 3) aniline
  - 4) benzoic acid
59. For a reaction  $A + B \rightarrow C + D$  if the concentration of  $A$  is doubled without altering the concentration of  $B$ , the rate gets doubled. If the concentration of  $B$  is increased by nine times without altering the concentration of  $A$ , the rate gets tripled. The order of the reaction is
- 1) 2
  - 2) 1
  - 3)  $\frac{3}{2}$
  - 4)  $\frac{4}{3}$
60. Which of the following solutions will exhibit highest boiling point ?
- 1) 0.01 M  $Na_2SO_4$  (aq)
  - 2) 0.01 M  $KNO_3$  (aq)
  - 3) 0.015 M urea (aq)
  - 4) 0.015 M glucose (aq)

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