

## ROY'S INSTITUTE OF COMPETITIVE EXAMINATION

### RRB NTPC GRADUATE & UNDER GRADUATE CBT-1

# / CHEMISTRY /

## HANDOUT - 1

1. What is the industrial name for calcium sulphate hemihydrate?  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ 
  - a) Gypsum  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
  - b) Quick lime  $\text{CaO}$
  - c) Plaster of Paris
  - d) Slaked lime  $\text{Ca}(\text{OH})_2$
2. Which law states that a compound always contains the same elements in the same proportion by mass?
  - a) Law of Conservation of Mass
  - b) Law of Definite Proportions
  - c) Law of Multiple Proportions  $\text{CO}, \text{CO}_2$
  - d) Avogadro's Law
3. Which acid and its salts are widely used as food preservatives to prevent the growth of mould, yeast and fungi?
  - a) Perchloric acid
  - b) Boric Acid
  - c) Malic acid
  - d) Sorbic acid  $\text{Na}/\text{K}/\text{Ca}$
4. Which type of reaction is involved in the rusting of iron?
  $\text{Fe} + \text{H}_2\text{O} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O} \Rightarrow \text{Rust} [\text{Compound}]$ 
  - a) Displacement
  - b) Redox
  - c) Neutralisation
  - d) Decomposition
5. Which fundamental law of chemistry is illustrated by the fact that hydrogen and oxygen always combine in a fixed 1 : 8 mass ratio to form water?  $\text{H}_2\text{O} = 2:16 = 1:8$ 
  - a) Law of Conservation of Energy
  - b) Dalton's Atomic Theory
  - c) Law of Multiple Proportions
  - d) Law of Constant Proportions
6. Which of the following is not a state function or state variable in a thermodynamic system?
  - a) Pressure
  - b) Enthalpy
  - c) Work
  - d) Internal energy

*(S) entropy, enthalpy, (H) internal energy, Gibbs free energy, path function (G), w (work), q (heat)*
7. In Lassaigne's test, when a portion of the solution is heated in the presence of an iron (II) Sulphate solution, which element is revealed by the formation of a Prussian blue precipitate?  $\text{N}, \text{S}, \text{Halogen} (\text{Cl}, \text{Br}, \text{I})$  Blood red =  $\text{N}, \text{S}$ 
  - a) Oxygen
  - b) Carbon
  - c) Hydrogen
  - d) Nitrogen

*Now metal is used*
8. Which of the following is a correct representation of a compound formed by ionic bonding?  $(\text{met al} + \text{non - metal})$ 
  - a)  $\text{H}_2\text{O}$
  - b)  $\text{CO}_2$
  - c)  $\text{NaCl}$
  - d)  $\text{NH}_3$

*Non - metal + non - metal = covalent ( $\text{Be} \rightarrow \text{metal} = \text{covalent bond}$ ) metal + different metal carbide = IB + CB KCN = IB + CB*
9. In 1995, physicists Eric Cornell and Carl Wieman created the first Bose-Einstein Condensate (BEC) using which  $\text{Na}^{+}$  isotope?
  - a) Caesium-133
  - b) Thorium-232
  - c) Rubidium-87
  - d) Sodium-23

*5th state*
10. Which acid is used in non-ionic detergent reactions to improve cleaning qualities and thicken detergents?
  - a) Stearic acid *(oleic/palmitic)*
  - b) Barbituric acid
  - c) Propanoic acid
  - d) Oxalic acid

11. Which sweetener, first used in 1879, has received FDA approval for use in fruit juice beverages?
- a) Aspartame      b) Sucratose      c) Saccharin      d) Neotame
12. "Triclosan" considered harmful when exposed to high levels for a long time, is most likely present in which of the following? *broad spectrum antibacterial, antifungal → toothpaste, soaps, cosmetics*
- a) Food preservatives      b) Fruit ripening substances      c) reused plastic containers      d) Toiletries.
13. Soap removes grease by – *Na salt of fatty acids*  $C_{17-43}H_{35}COONa \rightarrow$  *Hydrophilic head*  
*Banc in nature*      *Hydrophobic tail*
- a) absorption      b) emulsification      c) coagulation      d) none of these
14. Which types of bonds are present in hydrate *copper sulphate*?  $CuSO_4 \cdot 5H_2O \Rightarrow$  *Blue vitriol*
- a) Ionic and covalent bond      b) Covalent and dative bond      c) Ionic, covalent and dative bond      d) Ionic, covalent, dative and hydrogen bond.
15. Which one of the following carbon compounds will not give a sooty flame? *→ Aromatic compounds*
- a) Benzene      b) Hexane      c) Naphthalene      d) Anthracene.
16. Difference of molecular weight between two successive members of any homologous series is –  $C_2H_2 = 12 + 2$   
 $C_3H_6 = 12 + 2$   
 $C_4H_8 = 12 + 2$
- a) 16      b) 14      c) 12      d) 18
17. Which among the following is formed when an alcohol is dehydrated?  $C_2H_5OH \xrightarrow{-H_2O} C_2H_4$  *Ethylen*  
*alcohol*       $C_2H_4 = CH_2$       *Calkene*
- a) Alkane      b) Alkyne      c) Alkene      d) Aldehyde
18. Which of the following solutions do not conduct electricity?
- a) Sodium hydroxide solution      b) Acetic acid solution  
c) Sugar solution      *sucrose*  $C_{12}H_{22}O_{11}$       d) Hydrochloric acid solution
19. One of the following processes does not involve a chemical reaction, that is –
- a) Melting of candle wax when heated      b) Burning of candle wax when heated (*both*)  
c) Digestion of food in your stomach      d) Ripening of banana
20. The term 'Carbon footprint' means –
- a) A region which is rich in coal mines  
b) The amount of reduction in the emission of  $CO_2$  by a country  
c) The use of carbon in manufacturing industries  
d) The amount of greenhouse gases *produced* *reduces* by our day-to-day activities
21. The equation of state corresponding to 7 gm of  $N_2$  is –  $PV = nRT$        $n = \text{no. of moles}$   
 $\frac{PV}{n} = RT/4$
- a)  $PV = 7RT$       b)  $PV = RT/4$       c)  $PV = RT$       d)  $PV = RT/2$
22. Use of hot air balloons in sports and metrological observations is an application of –
- a) Gay- Lussac's law      b) Charles's law  
c) Dalton's Partial Pressure law      d) Kelvin's law

23. The rates of diffusion of gases A and B of molecular weights 36 and 64 are in the ratio –  $r \propto \sqrt{\nu_M}$
- a) 9 : 16      b) 4 : 3      c) 3 : 4      d) 16 : 9
- $$\frac{r_A}{r_B} = \sqrt{\frac{M_B}{M_A}} = \sqrt{\frac{64}{36}} = \frac{8}{6} = \frac{4}{3}$$
24. The most favourable conditions for ionic bonding are –
- a) Low charge on ions, large cation, small anion  
 b) Low charge on ions, large cation, large anion  
 c) High charge on ions, small cation, large anion  
 d) High charge on ions, large cation, small anion
- Metal - e⁻ = cation (+ve)*      *Non-metal + e⁻ = anion (-ve)*      → low IE      → high EA
25. In which one of the following cases do both physical and chemical changes take place?
- a) combustion of candle → Chemical  
 c) burning of candle      *Burning = Combustion melting*
- b) rusting of iron  
 d) cooking of food
26. Which of the following method can be used for separating a mixture of NaCl & NH<sub>4</sub>Cl? *Naphthalene, I<sub>2</sub>, camphor, dry ice*
- a) Crystallisation      b) Centrifugation  
 c) Sublimation      d) Chromatography.
27. Hydrogen blended compressed natural gas is being used in transport vehicle because –
1. It adds minimally to the weight that making the vehicle highly fuel efficient.  
 2. It emit less carbon dioxide and other pollutants as compared to liquid fuels. ✓  
*H<sub>2</sub> → only water vapour as exhausts.*  
 3. Hydrogen is less poisonous and there is less risk to passengers in case of any leakage of gas inside the vehicle.
- a) 1, 2 and 3 all      b) 2 and 3 only      c) 3 only      d) 2 only
28. The state of matter in which electrons are free in the cloud rather than attached to individual atoms called –
- a) gas      b) plasma      *4th state Ionised gas*      c) solid      d) liquid
29. Which acid is commonly called acetic acid and is related to a group called carboxylic acid? *CH<sub>3</sub>COOH (oic acid)*
- HCOOH = Methanoic acid*  
 a) Formic acid      b) Propanoic acid      c) Ethanoic acid      d) Picric acid      *Tri-nitro phenol (TNP)*
30. Which unsaturated aliphatic hydrocarbon composed of 20 carbon atoms is used to make candles & paraffin wax with solar energy storage capacity?
- a) Nonane      b) Triacontane      c) Eicosane      d) Octane
31. Which of the following is an ester? *Acid + Alcohol ⇌ Ester + Water*
- CH<sub>3</sub>COOH + CH<sub>3</sub>OH → CH<sub>3</sub>COOCH<sub>3</sub>*
- a) CH<sub>3</sub>CHO      b) CH<sub>3</sub>COOH      c) CH<sub>3</sub>COOC<sub>2</sub>H<sub>5</sub>      d) CH<sub>3</sub>COCH<sub>3</sub>  
*aldehyde      acid      ester      ketone*
32. Trichloromethane is commonly known as – *CH<sub>4</sub> (methane)      CHCl<sub>3</sub>*
- a) freon      b) chloroform      c) picric acid (explosive)      d) noble oil      *tri-nitro glycerine (explosive) TNQ*
33. Formaldehyde is used in which of the following industry? *Preservative & stabilizer*
- a) Air conditioners      b) Perfumes      c) Refrigerators      d) Fire extinguishers
34. Lighting in atmosphere produces – *N<sub>2</sub> + O<sub>2</sub> → 2NO - heat [endothermic reaction]*
- a) N<sub>2</sub>O      b) NO      c) NO<sub>2</sub>      d) CO<sub>2</sub>  
*(laughing gas)*

35. The Van der Waal's equation reduces itself to the ideal gas equation at – *Real gas → Ideal gas*  
*(Real gas follows)*
- a) High pressure and low temperature      b) Low pressure and low temperature  
 c) Low pressure and high temperature      d) High pressure and high temperature
36. Arrange the following compounds in increasing order according to the length of their carbon-carbon bond: Ethene, Ethyne, Ethane      *C-C > C=C > C≡C*
- a) Ethyne, Ethene, Ethane      b) Ethane, Ethyne, Ethene  
 c) Ethene, Ethyne, Ethane      d) Ethane, Ethene, Ethyne      *CH<sub>3</sub>-CH<sub>3</sub> > CH<sub>2</sub>=CH<sub>2</sub> > CH≡CH*
37. Dead organs are usually kept in Formalin. It contains –
- a) Aqueous formaldehyde (*40% HCHO*)      b) Aqueous ferrous-sulphate  
 c) Aqueous formic acid      d) Aqueous ferric alum
38. Synthetic fibres catches fires easily, however the uniform of fireman have a coating of \_\_\_\_\_ plastic to make them flame resistance.
- a) Nylon      b) Melamine      c) Rayon      d) Acrylic  
*PTFE = poly tetrafluoro ethylene*
39. Teflon is used in cooking equipment in a non-stick coating, used in the electronic industry due to its insulation characteristic in wiring etc., is a polymer containing carbon \_\_\_\_\_ bonding is involved.
- a) chloride      b) fluoride      c) bromide      d) iodide
40. Leakage of LPG can be easily detected by spreading \_\_\_\_\_ in air. *Butane / Propane / iso butane*
- a) methyl isocyanate      b) nitrous oxide      c) ethyl mercaptan      d) methyl mercaptan  
*C<sub>2</sub>H<sub>5</sub>SH*  
*Thio ethanol*