**FORM 3 END TERM 2 2021 CHEMISTRY MARKING SCHEME**

1.

|  |  |
| --- | --- |
| **Luminous flame** | **Non-luminous flame** |
| **Sooty/smoky**  **Not very hot**  **Quiet**  **Not steady**  **Has four regions** | **Non sooty/non smoky√**  **Very hot√**  **Noisy√**  **Steady√**  **Has three regions√** |

2. **In molten state or when dissolved in water in aqueous state√**

3.. **Add water to the two mixtures in a separating funnel. √**

**Ethanol dissolves. Pentane does not√**½**.**

**Allow the mixture to separate into two layers. √**½

**Open the tap to drain the lower aqueous layer. √**½

**Fractional distil the aqueous layer to get ethanol first. √**½

4. **Supply of oxygen in the room will be limited√ leading to formation of carbon (II) oxide which is toxic/poisonous√.**

5. **Ammonium chloride decompose/dissociate to ammonia and hydrogen chloride gases√.**

**Ammonia is less dense than hydrogen chloride gas therefore diffuses faster√.**

**Ammonia gas is basic thus turns moist litmus paper blue√**½**.**

**Hydrogen chloride gas is acidic thus turns moist litmus paper red√**½**.**

6. **Molar mass CO2 = 44 g√**½

**Molar mass O2 = 48 g√**½

**T O3 = √ M O3 => 96 seconds. = √ 48 √√**½ **= 91.9seconds√**½

**T CO2 = √ M CO2 T CO2  √ 44**

7. **Heat √** **the mixture in a covered beaker containing cold√**½ **water.**

**Iodine sublime√**½ **out and collect below the cold beaker**

**Lead (II) sulphate remain.**

8. a) **colour change from brown to black√**

b) **CuO (s) + CO (g) -> Cu(s) + CO2 (g) √**

c) **It is poisonous/toxic thus pollutes the environment√**

9. (a) **Oxygen/O2√**

(b) **Decomposition√**

**c) 2 KNO3 (s) Heat 2KNO2(s) + O2(g)**

10. **Add excess zinc oxide to dilute HCl, H2SO4 / HNO3√.**

**Filter√**½ **excess zinc oxide.**

**Add Na2CO3, K2CO3 to the filtrate√**½**.**

**Filter√**½**.**

**Wash the filtrate with distilled water.**

**Dry between filter papers√**½**.**

11. a) **Manganese(IV)oxide√**

**b) 2 H2O2 (aq) -> 2H2O (l) + O2 (g) √**

(c) **In oxy-acetylene flame for welding√**

**As rocket fuel. √**

**Breathing aid in hospitals√**

**Steel making√**

**Deep sea diving√**

12. (a) **Ammonia is basic gas. Sulphuric (VI) acid is acidic. It would neutralize / react with the gas√**

(b **Calcium oxide√**

13. a) **At constant temperature, the volume of a fixed mass of gas is inversely proportional to its pressure. √**

1. **P1V1 =P2V2 => 1 x3 = 2 x V2√**

**V2 = 1.5 litres√**

14. a) **MgCO3(s) + 2H + (aq) -> Mg2+(aq) + CO2(g) + H2O(l) √**

**b) Mole ratio MgCO3(s): CO2 (g) = 1:1**

**Molar mass CO2 (g) = 44g√**½

**Molar mass MgCO3(s) = 84g√**½

**Method 1**

**44g CO2 (g) -> 84g MgCO3(s)**

**8.4g CO2 (g) -> 8.4 x 84 √**½ **= 16.0364g√**½

**44**

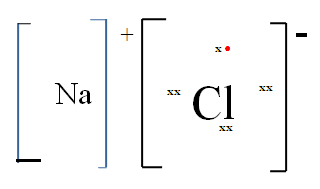
**Method 2**

**Moles CO2 (g) = 8.4 = 0.1909moles√**½

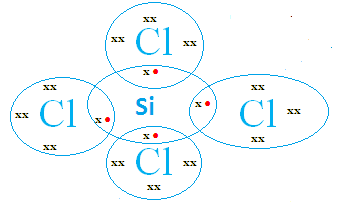
**44**

**Mass MgCO3(s) = 84g x 0.1909 = 16.036g√**½

15. a)



b)



16. a) **C and E √**

**They are isotopes√. Have same atomic number but different mass number.**

**b) 7 - 3 = 4 √ neutrons**

17. **Mass of C in CO2 = 12 x 4.2g = 1.1455g√½**

**44**

**Mass of H in H2O = 2 x 1.71g = 0.19g√½**

**18**

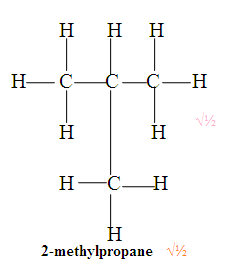
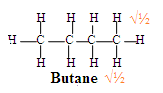
**Method 1**

|  |  |  |
| --- | --- | --- |
| **element** | **C** | **H** |
| **mass** | **1.1455g √½**  **12** | **0.19g √½**  **1** |
| **Number of Moles** | **0.0955**  **0.0955** | **0.19g**  **0.0955** |
| **Mole ratios** | **1** | **1.9895 = 2√½** |

**Empirical formula CH2√½**

18.(a) **Compounds with the same molecular/general formula but different structural formula.√**

(b)

19. **Relative atomic mass of L = (69.09% x 62.93) + (30.91% x64.93√**

**100**

Penalize fully for answer if any units used

**= 43.4783 +20.0699**

**= 63. 5482√**

20. a) **Oxygen//O2 √**

b) **pH decrease√**

**HOCl decomposes to hydrochloric acid √ which is a strong base with low pH**

21. (a) Hydrogen gas

b) **Mg(s) + H2O (g) -> MgO (s) + H2 (g) √**

(c) **Slightly soluble√/insoluble in water**

22. (a) **C√**

(b) **A√**

(c) **B**

**23.** (a) **When gases react/combine at the same temperature and pressure they do so in volume ratios which bear single ratios to each other and to the volume of the products if gaseous. √**

(b) **C2Hx + O2 (g) -> CO2 + H2O (g) √** ½

**Reacting volume 10cm3 30cm3 20cm3**

**Divide by smallest volume 10 10 10√** ½

**Volume ratios 1 3 2√** ½

**Balanced equation C2Hx + 3O2 (g) -> 2CO2 + H2O (g)**

**Since “3O2” = 6O where “4O”form CO2 then “2O” form H2O using “4H” thus x = 4√** ½

**24.**  (a) **Simple covalent bonding//covalent√** ½ **bonding**

**Dative√** ½ **//coordinate bonding**

1. **7 bonds x 2 electrons each = 14 electrons√**

25. i)  **F√**

1. **13 protons + 14 neutrons = 27√**
2. **E2G3√ // Al2O3**
3. **Ionic√//electrovalent**
4. **E has a smaller√ atomic radius than C.E has more proton √which increase the nuclear charge attraction of outer electrons pulling them more closer than C**
5. **Particle B has a stable octet electrons in outer energy level thus inert. √**

26. a) A binary electrolyte is an electrolyte that contains one type of cation and one type of anion.

b) i) **Source of heat/heat√**

1. In molten state the ions are mobile
2. Anode

2Br – (l) Br2 (g) + 2e

Cathode

Pb2+ (l) + 2e Pb (s)

27. a) **Copper(II)hydroxide//Cu(OH)2√**

1. **[Cu(NH3)4]2+√ // tetraamminecopper(II) complex**

28. **It is required to break the strong N N bond. √**

29. a) i) **Ethanol√// C2H5OH/ CH3CH2OH**

1. **Slightly soluble in water√/insoluble in water**

b) Name the polymer.

**Polyethene√**

Disadvantage of the polymer

**Non-biodegradable therefore pollute the environment√.**

**Produces toxic/poisonous gases when burnt.**

30. (a) The reaction between ammonia and oxygen is exothermic thus the heat produced makes the platinum to remain red hot.

(b) NH3 (g) + O2 (g) NO2 (g) + H2O (l)

31. **Strong base is one which is fully dissociated into many OH- ions.**

**E.g. sodium hydroxide/NaOH//Potassium hydroxide/KOH**

**Weak base is one which is partially/partly dissociated into many OH- ions.**

**E.g. Aqueous ammonia/NH3 (aq)//calcium hydroxide Ca (OH) 2**

32. a) **Lie big condenser**

**b) To show when vapour fractions are distilling off**

**c) C√**

**33. a) It is a hydrocarbon that contains maximum number of hydrogen atoms**

**b) It is breaking down of a long chain alkane to form a short chain alkane, alkene and hydrogen gas in the presence of a catalyst.**

**34. Ammonia and carbon (IV) oxide**