ASUMBI GIRLS HIGH SCHOOL

POST -MOCK 1

AUGUST/SEPTEMBER 2022

1 (a) A broad range indicator that can give the degree of acidity and alkalinity of a substance;

(b) Can give the degree of acidify and alkalinity of a substance;

2 (a) Evaporating dish;

(b) Evaporating liquids;

(c) Pair of tongs;

(d) Used to safely hold hot or corrosive solids;

3 (a) - Blue flame;
- White fumes;

(b) Oxygen is bubbled into molten iron; the oxygen reacts with carbon, sulphur and phosphorus impurities; which escape leaving iron more pure;

4 (a) Under same conditions of temperature and pressure, the rate of diffusion of a gas is inversely proportional to the square root of its density;

(b) Calculation:

$$\frac{V1}{T1} = \frac{V2}{T2}$$

V1 = 1
V2 = 2
T1 = 127 + 273 = 400

$$T2 = \frac{V2T1}{V1}$$

$$= \frac{2 \times 400}{1} = 800K$$

5 (a) Temporary physical change – a reversible reaction in which no new substance is formed;
Temporary chemical change – a reversible reaction in which a new substance is formed;
Owtte

(b) Table

Solid	Observations on heating	Type of change
$CuSO_4.5H_2O$	Blue solid forms a white solid; Droplets of a colourless liquid forms in the cooler parts of the test tube	Temporary chemical
$KMnO_4$	Purple solid forms a mixture of a green solid and a black solid; Evolution of a colourless odourless gas that relights a glowing splint;	chemical

6. To separate test tubes of bromine water; bubble each of the gases separately; both decolourise the yellow bromine water but the reaction is faster in ethyne;
Accept the use of $KMnO_4$.

7. – Add excess calcium carbonate to dilute nitric (V) acid / dilute hydrochloric acid;
- Filter to obtain a solution of calcium nitrate /calcium chloride;
- Add water to solid sodium sulphate and stir to dissolve;
- Add sodium sulphate to the calcium nitrate / calcium chloride;
- Filter to obtain calcium sulphate and sodium nitrate / sodium chloride;
- Rinse with distilled water and dry between filter papers;

8 (a) Insert a burning splint into a gas jar of the gas; it extinguishes the burning splint with a pop sound;

(b) (i) - Grey solid forms a yellow solid which on cooling changes to white;
- Bubbles of a colourless odourless gas;

(ii) To drive out atmospheric air; so prevent zinc from being oxidized by the oxygen in the air hence preventing reaction between zinc and air;

9 (a) Covalent bond: a chemical bond formed due to sharing of electrons which have been donated by both atoms;
Coordinate bond: a chemical bond formed by sharing electrons, where the electrons shared has been contributed by only one atom;

(b) X – 4
Y – 2
Z – 3;

10 (a) $SiCl_{4(aq)} + H_2O_{(l)} \rightarrow SiO_{2(s)} + HCl_{(aq)}$;

(b) White fumes; silicon (IV) oxide is hydrolysed in water to form $HCl_{(g)}$; the reaction is exothermic sop the resultant HCl is released as white fumes;

11. Calculation:
moles of ethanoic acid reacting:
1000 cm^3 → 0.16moles
25 cm^3 → $\frac{25 \times 0.16}{1000}$ = 0.004 moles;
Moles of KOH reacting = 0.004 from reaction ratio.
12.5 cm^3 → 0.004 moles
250 cm^3 → $\frac{250 \times 0.004}{12.5}$ = 0.08 moles;
RMM of KOH = 39 + 16 + 1 = 56
Mass of KOH used = 56 x 0.08 = 4.48g;

12 (a) Reduce the diffusion of oxygen in the glass tube to provide more time for reaction with ammonia;

(b) Green – yellow flame;

(c) $4NH_{3(g)} + O_{2(g)} \rightarrow 2N_{2(g)} + 6H_2O_{(l)}$;

13 (a) - Vanadium (V) oxide catalyst;
- Pressure of 2- 3 atmospheres;
-400°C - 500°C;

(b) - Decrease in temperature;
- Increase in pressure;

14 (a) $2NaOH_{(aq)} + Cl_{2(g)} \rightarrow NaOCl_{(aq)} + NaOCl_{(aq)} + H_2O_{(l)}$;

(b) $CaOCl_2$ dissociates to liberate oxygen atoms; which oxidizes the dye hence bleaching the dyes;

15 (a) - The thistle funnel is not dipping into the solution;
- Wrong method of gas collection;

(b) $HCOOH_{(aq)} \rightarrow CO_{(g)} + H_2O_{(l)}$;

(c) Extraction of less reactive metals by reducing their oxides;

16 (a) Substances 2 and 4;

(b) – Add solid sodium carbonate / sodium hydrogen carbonate to separate sample of each; bubbles of a colourless odourless gas with 1but no reaction with 2;
- Bubble or add each separately to bromine water; no reaction with 1 but 2 decolourizes the yellow bromine water;
- Bubble or add each separately to acidified potassium manganate (VII); no reaction with 1 but 2 decolourizes purple acidified potassium manganate (VII);
- Add magnesium / zinc metal to each separately; bubbles of a colourless gas with 1but no reaction with 2;
Consider only the first one
Accept anyone correct

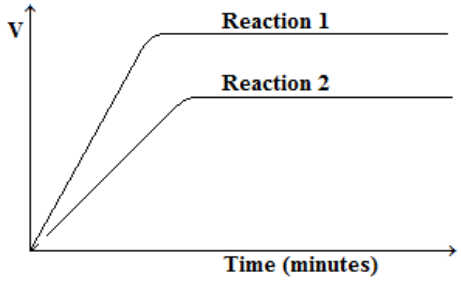
17. Carbon – Remains the same
Hydrogen – decreases;
Oxygen – decreases;

18 (a) (i) Phosphoric acid;
(ii) Oxidation;
(iii) Esterification;
(iv) Ethylethanoate;

(b) Orange acidified potassium dichromate (VI) changes from orange to green chromium (III) ions;

(c) $CH_3COOH + CH_3CH_2OH \rightarrow CH_3COOCH_2CH_3 + H_2O$;

19 (a) Graph sketches



(b) - More volume of gas is produce in reaction 1 because there are more magnesium particles to displace hydrogen ions to form hydrogen gas;
- Reaction 1is also faster because the higher mass of magnesium leads to a higher number of reacting particles which leads to more successful collisions;

20 (a) Use of lead (II nitrate in the salt bridge; lead (II) ions migrate to the copper half cell; leading to formation of a precipitate in the salt bridge which stops flow of ions;

(b) (i) $Zn_{(s)} \rightarrow Zn^{2+}_{(aq)} + 2e$;
(ii) $EMf = E_{reduced} - E_{oxidised}$
$= - 0.34 – (+0.76)$
$= + 0.42V$;

21. The green colour fades while the yellow colour intensifies; addition of silver nitrate introduces silver ions which increases concentrations of particles on the right; hence shifting the equilibrium to the right;

22 (a) NaNO3;

(b) Still would react with product at the cathode /chlorine due to the high temperatures in the cell;

(c) $Na^+_{(l)} + e \rightarrow Na_{(l)}$;
$Ca^{2+}_{(l)} + 2e \rightarrow Ca_{(l)}$;

23 (a) The time taken for half a given mass/amount of a radioactive substance to decay;

(b) (i) The nucleus of an atom as characterized by the sum total of protons and neutrons therein;

(ii) Total number of half lifes
$\frac{7.5}{1.5} = 3$
$100 \rightarrow 50 \rightarrow 25 \rightarrow 12.5$
Percentage = 12.5%;

24 (a) Endothermic;

(b) $\Delta H = b – a$;
$Ea = c – b$;

25. In solid state the ions are held static in the crystal lattice; melting frees the ions leading to free mobile ions for electrical conductivity;