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CHEMISTRY FORM 4 MARKING SCHEME

1. Processes

- (i) Bleaching.
- (ii) Addition polymerization.

2. Periodic Table

- a) Smallest ionic radius: B (Aluminum). Explanation: Higher nuclear charge pulls electrons closer.
- b) Largest atomic size: C (Silicon). Explanation: Atomic radius decreases across a period; C is furthest left among non-metals listed.

3. Hydrocarbon Z (C_2H_2): Series is Alkynes. 8th member is Octyne (C_8H_{14}). Name and structure required.

4. Structures

- (i) 3-chlorohex-1-ene.
- (ii) 2,2-dimethylpentane.

5. Isomerism

- (a) Existence of compounds with same molecular formula but different structures.
- (b) Butene isomers: But-1-ene, But-2-ene (Cis/Trans).

6. Oxidation number of Cr in $K_2Cr_2O_7$

- +6. (1mk)

7. Apparatus for 15.4ml: Burette. (1mk)

8. Bleaching Action

- Chlorine: Permanent; oxidizes pigment.
- Sulphur (IV) oxide: Temporary; forms addition complex.

9. Moles of CO_2

- Equation: $Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 + H_2O + CO_2$.
- Ratio 1:1. (2mks)

10. Electrolysis of $PbBr_2$

- Molten $PbBr_2$ dissociates. Pb^{2+} moves to cathode (Lead metal). Br^- moves to anode (Bromine gas). (2mks)
- Fume chamber: Bromine gas is toxic/irritating.

11. Chromatography

- (a) Separating components based on differential solubility/adsorption.
- (b) Analyzing mixtures, checking purity, separating pigments.

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12. Chlorine Preparation

- (i) Equation: $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$.
- (ii) Another reagent: $KMnO_4$.

13. Contact Process

- (a) I. Liquid Y: Oleum. II. Liquid N: Conc. H_2SO_4.
- (b) I. Chamber Q:

$2SO2+O2 \rightleftharpoons 2SO3$

.

- II. Chamber R:

$SO3+H2SO4 \rightarrow H2S2O7$

.

14. Charles' Law

- (a) Graph of V vs T (K) is a straight line through origin.
- (b) Calculation:
  - $T1=250K, V1=250cm3$

.

  - $T2=400K$

.

  - $V2=(250/250)\times400=400cm3$

. (3mks)

15. Chloride ions in $MgCl_2$

- Moles $MgCl_2 = 1.7 / 95 \approx 0.0179$.
- Moles $Cl^- = 0.0179 \times 2 = 0.0358$.
- Number =

$0.0358\times6.0\times1023=2.15\times1022$

ions. (3mks)

16. Sulphur (IV) Oxide

- (a) Reagent: Na_2SO_3 or Cu + Conc. H_2SO_4.
- (b) Observation: Blue litmus turns Red (acidic).

17. Vulcanized Rubber

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- Two properties: Harder, stronger, more elastic, non-sticky, higher melting point.

18. Frasch Process
    - Sulphur flows through middle pipe due to pressure of hot compressed air from inner pipe pushing it up.
19. Sulphuric Acid Manufacture
    - (a) Reasons: SO_3 dissolves exothermically; water produces mist; direct absorption difficult.
    - (b) Use: Fertilizers, car batteries, detergents, paint making.
20. Greenhouse Gases
    - (i) Effect: Global warming.
    - (ii) Nitrogen (I) Oxide: Fertilizers, combustion.
    - Trichloromethane: Solvents, refrigerants.

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