

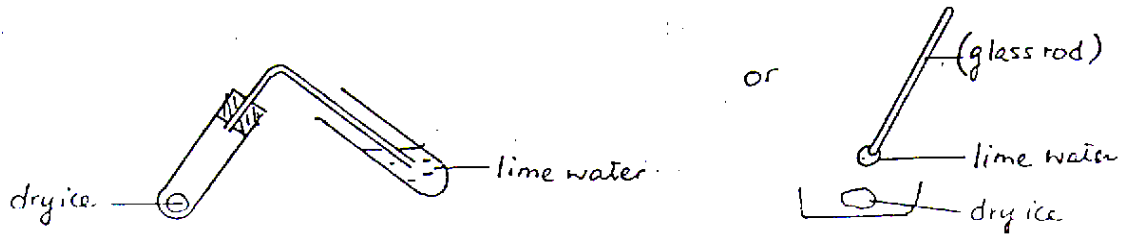
## 2008 - 2009 FIRST TERM EXAMINATION

### F4 Chemistry

#### Marking Scheme

- 1 (a) Isotopes are atoms with the same atomic number but different mass no. / the same number of protons but different number of neutrons. 1
- (b)  $RAM = 49 \times 47.9 / 101 + 43 \times 10.6 / 101 + 46 \times 42.5 / 101$   
 $= 23.24 + 4.51 + 17.88$   
 $= 45.63$  (no unit) 1
- (c) No, because isotopes of an element have the same chemical properties (NOT accept similar) 1
- 2 (a)  $CrO_4^{2-}$  1
- (b) The sodium sulphate solution provides ions for the conduction of electricity / acts as an electrolyte / completes the circuit 1
- (c) (1) The blue colour becomes paler/ colourless/ fades 1  
 (2) Green. 1  
 Under the influence of the electric field, cations in the deep blue solution are attracted to the negative pole (move to the left) and negative /  $CrO_4^{2-}$  ions are attracted to the positive pole (move to the right). 1  
 OR  
 Under the influence of the electric field, the cations and anions are respectively attracted towards the negative and positive poles (1)
- The yellow negative ions and the blue positive ions mix / meet at B to give the green colour. 1
- (d) reverse the polarity of the d.c. supply 1  
 OR connect the left hand electrode to the positive pole and the right hand electrode to the negative pole (1)
- Observation:  
 yellow colour will appear at the left of A and blue colour will appear at the right of C 1
- 3 (a) Quartz is a giant covalent network / covalent crystal. 1  
 The attraction between (Si and O) atoms in quartz is covalent bond. 1  
 Carbon dioxide has a simple molecular structure and the attraction between molecules is weak van der Waals' forces. 1  
 Covalent bond is stronger than van der Waals' forces / intermolecular force therefore, quartz is solid and  $CO_2$  is gas 1

(b)



Observation: lime water turns milky, 1  
 no liquid residue remains (in the test tube) 1

4. (a) Metal ion 2

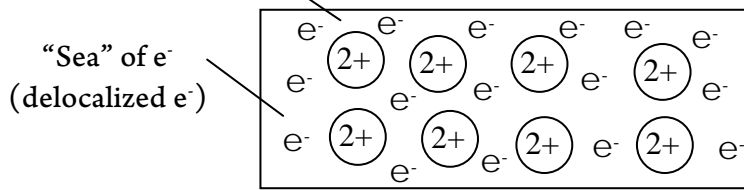


Diagram — 1 mark  
 Correct label — 1 mark

(b) (1) Electrons are free to move. 1  
 (2) Layers can slip easily without breaking the metallic bond. 1  
 (3) Atoms are packed closely. 1

5. (a) (i) (1) B or C is suitable for electrical cable. 1  
 C has a very good electrical conductivity and the cost is comparatively low. 1  
 B has a very good electrical conductivity and the rate of corrosion is slow. (1)  
 (2) A or B may be chosen. 1  
 A has a good metallic strength and the price is lower than C. 1  
 B has a slow rate of corrosion. It is more expensive but it can last longer. (1)

(ii) Painting, electroplating etc. 1

(b) (i) Calcium is more reactive than titanium. 1

(ii)  $2\text{Ca}(s) + \text{TiCl}_4(s) \longrightarrow 2\text{CaCl}_2(s) + \text{Ti}(s)$  1

(iii) Prevent Ca and Ti react with  $\text{O}_2$ . 1

(iv) Dissolve the mixture in cold water. ( $\text{MgCl}_2$  will dissolve in water but Ti will not) 1

- 6 (a)  $R > Q > S > P$  1  
 (b) R 1  
 $R(s) + H_2O(l) \longrightarrow ROH(aq) + H_2(g)$  1  
 OR  $Q(s) + 2H_2O(l) \longrightarrow Q(OH)_2(aq) + H_2(g)$  (1)
- (c) Magnesium/Calcium/Aluminium 1  
 (d)  $Ca(s) + HCl(aq) \longrightarrow CaCl(aq) + H_2(g)$  1  
 (e) R, 1  
 since it is the most reactive, its compound is the most stable and the latest to be discovered. 1
- 7 (a) Effervescence / colourless gas bubbles / calcium metal dissolves 1  
 $Ca(s) + 2HNO_3(aq) \longrightarrow Ca(NO_3)_2(aq) + H_2O(l) + CO_2(g)$  1  
 (b) Potassium burns with a lilac flame / formation of white powder (solid) 1  
 $4K(s) + O_2(g) \longrightarrow 2K_2O(s)$  1  
 (c) Iron dissolves / Brown solid forms / solution turn green 1  
 $Fe(s) + 2CuNO_3(aq) \longrightarrow Fe(NO_3)_2(aq) + 2Cu(s)$  1  
 (d) Silvery solid forms. 1  
 $CuO + C \longrightarrow Cu + CO$  1  
 OR  $2CuO + C \longrightarrow 2Cu + CO_2$  (1)  
 (Do NOT accept evolution of gas)
- 8 No. of mole of  $H_2 = 0.15 / 24 = 0.00625$  mole  
 No. of mole of  $O_2 = 0.1 / 24 = 0.00417$  mole  
 $\therefore O_2$  is in excess. 1  
 No. of mole of gaseous remaining =  $0.00417 - 0.00625 / 2 = 0.001045$  mole 1  
 Volume of the gaseous remaining =  $0.001045 \times 24 = 0.025 \text{ dm}^3 = 25 \text{ cm}^3$  1

## MC

1. B	6. B	11. A	16. B	21. C
2. A	7. C	12. A	17. B	22. C
3. C	8. B	13. D	18. C	23. D
4. C	9. C	14. D	19. D	24. D
5. A	10. D	15. B	20. C	25. B

26 B	31 D	36 B	41 B
27 C	32 C	37 C	42 C
28 C	33 A	38 D	43 D
29 C	34 A	39 D	44 B
30 D	35 C	40 C	45 D