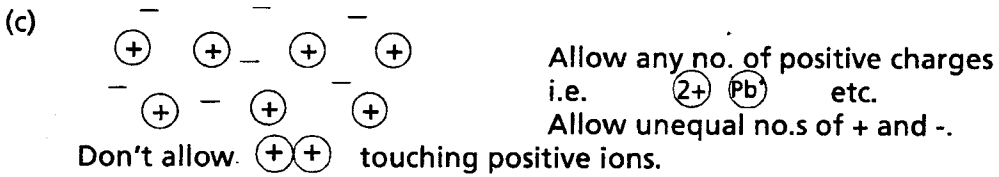


Unit Test 6251
SECTION A

1. (a) $2\text{NaHCO}_3 (\text{s}) \rightarrow \text{Na}_2\text{CO}_3 (\text{s}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$ allow multiples (1 mark)
- (b) Sodium hydrogencarbonate (1 mark)
- NOT hydrocarbonate, bicarbonate of soda
- (c) **Thermal** decomposition (1 mark)
- 2 (a) 126 (1 mark)
- (b)
$$\frac{206 \times 25.6 + 207 \times 21.2 + 208 \times 53.2}{100}$$

$$= 207.3$$
 MUST have 4 sf. for 2nd mark (1)
(1)
(2 marks)
- (c)  (1 mark)
- 3 (a) Solid disappearing/dissolving/reacting
Bubbles of gas given off/fizzing/effervescence
Solution becoming cloudy/milky/white precipitate } **Any two** (2 marks)
- (b) (i) Lime water/calcium hydroxide (1 mark)
(ii) Carbon dioxide/CO₂ (1 mark)
- 4 Butanal Allow butan-1-al (1)
Butanoic acid (1)
Recognition of aldehyde and carboxylic acid but not correct stem 1 (out of 2)
i.e. propanal, propanoic acid (2 marks)

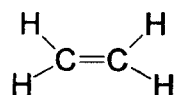
SECTION A, Total 13 Marks

5. (a) (i) Dehydration
 Elimination
 Thermal decomposition } **Any two** **(2 marks)**

(ii) Dehydrating agent eg Al_2O_3 /porous pot/ H_3PO_4 **(1)**
 (need to name dehydrating agent)
 Collection of ethene gas **(1)**
 Suitable apparatus including ethanol **(1)**
 heating under catalyst **(1)**
 -1 for poor diagram -1 will not work /incorrectly open/shut
 Using H_2SO_4 (l) can gain full marks

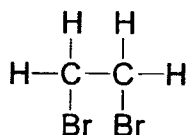
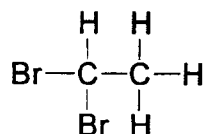
(iii) Prevents suckback. (of water) **(4 marks)**
 Must mention liquid

(b) (i) **(1 mark)**



(ii) reddish-brown/brown/yellow/orange → colourless NOT clear **(1 mark)**

(iii)



(1)

(1)

(2 marks)

If correct but no H's then max **1 (out of 2)**

Total 11 marks

6. (a) (i) H^+/H_3O^+ Allow no.s in front of H^+ (1 mark)
- (ii) Only ionises/dissociates partially – e.g. only slightly ionised, not fully ionised (1)
 If it implies dilute (rather than weak) or rate (e.g. easily, readily) rather than position of equilibrium then no marks
- in solution - must be implied – e.g. when dissolved, in water (1)
 (2 marks)
- (b) (i) $\frac{1}{4}$ mole (1 mark)
- (ii) 1 mol $H_2O_2 = 34$ g
 $\div 4 = 8.5$ (g) (1 mark)
- (iii) Volume = $\frac{8.5}{1.44} = 5.9$ (cm^3 allow c.c./ml ignore units unless incorrect) (1 mark)
- Allow 1,2 or 3 SF e.g. 6, 5.9 or 5.90
- (iv) Orange/yellow (1 mark)
 NOT orange/red i.e. anything with red / pink in is wrong
 but allow yellow/green.

Total 7 marks

7. (a) 2+ 3+ (1 mark)
- (b) SO_4^{2-} (1 mark)
- (c) $2Fe^{2+}(aq) + H_2O_2(aq) + 2H^+(aq) \rightarrow 2Fe^{3+}(aq) + 2H_2O(l)$ (1 mark)
- (d) Loss of electron(s) (1 mark)
 increase in oxidation number

Total 4 marks

8. (a) $2H_2(g) + 2O_2(g)$ State symbols needed (1 mark)
- (b) $\Delta H_f = -(2 \times -187.8) + (2 \times -285.8) = -196$ $kJ\ mol^{-1}$ Allow -196.0 $kJ\ mol^{-1}$
 Method (1)
 Value (1)
 units/sign (1) (3 marks)
- (c) 17 g of $H_2O_2 = \frac{1}{2}$ mol (1)
 $\therefore \frac{1}{4}$ mol $O_2 = \frac{1}{4} \times 24 = 6$ $dm^3/6000$ cm^3 (1)
 (2 marks)
- (d) Keep out of light }
 release build up of pressure } (1)
 keep only dilute solutions }
 Keep catalysts away }
 keep cool }
 because gas given off on decomposition }
 Accept justification on its own } (1)
 for 1 mark }
 (2 marks)

Total 8 marks

9. (a) (i) $\text{Be}^+(\text{g}) \rightarrow \text{Be}^{2+}(\text{g}) + \text{e}^-$ $-\text{e}^-$ on LHS OK
 formulae + correct electron state symbols (1)
 (1)
 (2 marks)
- (ii) Lithium.
 Removing 2nd electron from **innermost** shell (with extra proton compared to Helium) (1)
 If helium selected and justified worth 1 mark **MAX.** (1)
 (2 marks)
- (iii) Sodium.
 Extra shell of electrons (but Mg more protons to hold electrons) (1)
ALLOW 1 (out of 2) for magnesium if justified (1)
 (2 marks)
- (b) (i) $1s^2 2s^2 2p^6$ (1 mark)
- (ii) Neon (atom) Ne Sodium (ion) Na^+
 Fluoride (ion) F^- Magnesium (ion) Mg^{2+} } **Any two**
 Nitride (ion) N^{3-}
 Carbide (ion) C^{4-} (2 marks)
- (c)
- | | | | | |
|--|----|---|--|--|
| | x | | | |
| | xx | • | $\left[\begin{array}{c} \text{xx} \\ \text{Li} \end{array} \right]^+$ | $\left[\begin{array}{c} \text{x} \bullet \\ \text{H} \end{array} \right]^-$ |
| | Li | H | | |
- (1) (1) (1) (3 marks)
- Must be clearly in 2 shells
- (d) (i) Yellow/orange (1 mark)
- (ii) Electrons promoted/excited to energy levels/shells/orbitals OR (1)
 Fall back emitting light (of particular frequencies) (1)
 (2 marks)
- (iii) Many different energy levels in an atom (1 mark)
- (iv) Identifying presence of sodium in a substance/
 Measuring the amount of Na present/
 Sodium street lamps (1 mark)
- Total 17 marks**

END