## Unit Test 6251

**SECTION A**

**1** (a) Heat/energy released to surroundings **(1 mark)**

(b) Reduced as oxygen is removed/$Fe^{3+}$ has gained electrons/oxidation number of **Fe** has decreased **(1 mark)**

**2** (a) 160 **(1 mark)**

(b) Mass spectrometer **(1 mark)**

**3** (a) Sodium dichromate/potassium dichromate/$Na_2Cr_2O_7$/ $K_2Cr_2O_7$/ $KMnO_4$/potassium manganate (VII)/ permanganate. **(1)**

Sulphuric acid/$H_2SO_4$ **(1)** **(2 marks)**

(b) Acid: Donates protons/produces $H^+$ **ions** in solution **(1)**

Weak: An acid that has only partly ionised/slightly dissociated. **(1)** **(2 marks)**

**4** $1s^2 2s^2 2p^6 3s^2$ **(1 mark)**

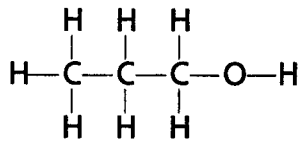
**5** $2Mg(NO_3)_2(s) \rightarrow 2MgO(s) + 4NO_2(g) + O_2(g)$ **(1 mark)**

*ALLOW whole equation divided by 2 (i.e. ½$O_2(g)$) or other correct multiples*

**TOTAL SECTION A: 10 MARKS**

**SECTION B**

**6** (a) (i)



**(1 mark)**

(ii) Diagram should show

Test tube containing propan-1-ol absorbed on suitable named absorbent **(1)**

Aluminium oxide/porous pot catalyst named **(1)**

Heat source **below** catalyst **(1)**

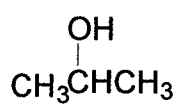
Collection of propene gas over water / gas syringe **(1)**

Penalise –1 for poor diagram/wouldn't work

**(4 marks)**

(b) (i) Sodium propoxide **(1 mark)**

(ii) 0.002 mol/ $2x10^{-3}$ mol **(1 mark)**

(c) (i) $CH_3CH(OH)CH_3$ *OR*  **(1)**

Propan-2-ol **(1)** **(2 marks)**

(ii) Propanal – from blue to red/green/orange/brown ppt **(1)**

Propanone – no change/stays blue **(1)**
'blue' must be mentioned as the initial colour at least once. **(2 marks)**

**(Total: 11 Marks)**

**7** (a) Solution too dilute
or
pH > 7 but < 9
or
footwear not immersed in solution for long enough
or virus avoids contact with sodium carbonate **(1 mark)**

(b) (i) $Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

Correct balanced equation **(1)**
All state symbols correct **(1)** **(2 marks)**

(ii) Burette **(1 mark)**

(iii) Yellow **(1)**

Orange **(1)** **(2 marks)**

(c) (i) 0.042 mol **(1 mark)**

(ii) 0.021 mol **(1 mark)**

(iii) 0.84 mol $dm^{-3}$
*Answers should be to 2,3 or 4SF in part (c)* **(1 mark)**

**(Total: 9 Marks)**

**8** (a) (i) Nichrome/platinum wire/ceramic rod **(1)**
cleaned in **concentrated** hydrochloric acid **(1)**
dipped in powdered sample and heated in flame **(1)**
both ideas needed for 3rd point. **(3 marks)**

(ii) Electrons promoted/excited to higher energy levels **(1)**

Fall back releasing energy as light of a particular frequency /wavelength/emr **(1)** **(2 marks)**

(iii) Sodium/$Na^+$ **(1 mark)**

(b) (i) 4.18 x 100 x 1.1 **(1)**
= 460J / 0.460 kJ/459.8J **(1)** **(2 marks)**

(ii) $M_r$ $MgSO_4.7H_2O$ = 246 **(1)**

12.3/246 = 0.05 **(1)** Allow TE **(2 marks)**

(iii) 460/0.05
+9200 J $mol^{-1}$ /+9.2 kJ $mol^{-1}$ **(1)**
sign and units (1)

-1 for incorrect SF.
ALLOW TE from b(i) and/or b(ii) **(2 marks)**

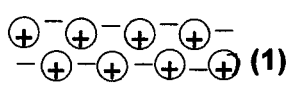
(c) (i) $\Delta H_r = \Delta H_1 - \Delta H_2$ **(1 mark)**

(ii) +9.2 - -85.2
= +94 kJ $mol^{-1}$ **(1)**
sign and units **(1)** **(2 marks)**

(d) Any sensible suggestion
e.g. affect taste
affect colour
inhibit yeast
inhibit enzymes
affect pH **(1 mark)**
*NOT* cost

**(Total: 16 Marks)**

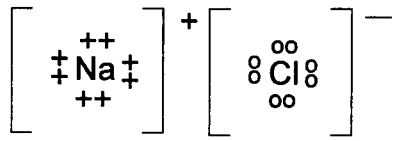
**9** (a) (i) Metallic **(1)**



**(1)**

Ions must not be touching and have a **single positive** charge. **(2 marks)**

(ii)



Correct number of electrons on each ion **(1)**
Correct charge on each ion **(1)** **(2 marks)**

(iii) Smaller (with some justification) **(1)**

fewer shells/energy levels **(1)**

increased relative nuclear charge 'pulls' remaining electrons closer to nucleus **(1)** **(3 marks)**

(b) Group 2 **(1)**

Significant / large / big increase in IE between 2nd and 3rd electron removed **(1)** **(2 marks)**

(c) Small dip in IE because

electron is in same quantum level/shell **(1)**

but is in higher energy sub level/shell **(1)** **(2 marks)**

(d) (i) <u>Similarity</u>

Similar/same trend across period/down a group **(1)**

<u>Difference</u>

Values for boiling point would be higher/height of bars bigger **(1)** **(2 marks)**

(ii) Density/atomic volume/electrical conductivity/electronegativity/ enthalpy or heat of vaporisation **(1 mark)**

**(Total:14 Marks)**