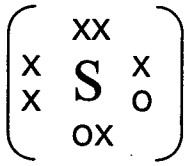
6251/01 (Unit Test 1) Mark Scheme

SECTION A

1. (a)



ALLOW 2,8,8
but NOT 2,8

8 electrons **(1)**
2- charge **(1)**

(2 marks)

(b) Argon/Ar **(1 mark)**

(c) K_2S **(1 mark)**

2. (a) $2\ X(NO_3)_2\ (s) \rightarrow 2XO\ (s) + 4NO_2\ (g) + O_2\ (g)$
or ÷ 2
-1 for each incorrect number **(2 marks)**

(b) Brown fumes given off
OR solid forms liquid/melts
OR bubbles of gas etc
1 correct observation and 1 incorrect observation = **0** **(1 mark)**

(c) Barium/Ba **(1 mark)**

3. (a) $Na\ (g) \rightarrow Na^+\ (g) + e^-$
Formulae **(1)**
State symbols **(1)** **(2 marks)**

(b) $1s^2 2s^2 2p^3$ **(1 mark)**

(c) Electron nearest/closest the nucleus *OR* from first full shell. **(1 mark)**

SECTION A, Total 12 Marks

4. (a) (i) Atoms of the same element/with the same number of protons with different atomic masses/different numbers of neutrons. **(1)**

$^{4}_{2}$He 2 neutrons $^{3}_{2}$He 1 neutron **(1)**

(2 marks)

(ii)

	p	n	e	
$^{3}_{1}$H	1	2	1	✓
$^{3}_{2}$He	2	1	2	✓

(1)

(1)

(2 marks)

(iii) Same atomic mass/mass number/molar mass.
Same number of subatomic particles in the nucleus/same number of nucleons. Only one quantum shell **(1 mark)**

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

(ii) $$\frac{99.01\times 4+0.99\times 3}{100}$$

= 3.990 **(1)**

MUST have 4sf. For 2nd mark **(1)**

(2 marks)

(c) The older the rock the greater the ratio (of $^{3}_{2}$He to $^{4}_{2}$He). **(1 mark)**

Total 9 Marks

5. (a) (i) $CH_3CH_2CH_2OH$ ✓ $CH_3CHOHCH_3$ ✓
Propan-1-ol✓ Propan-2-ol ✓

OH group must be shown ie NOT $CH_3CH_2CH_3O$ **(4 marks)**

(ii) $C_4H_{10}O$ **(1 mark)**

(b) (i) Propanoic acid **(1)**
$CH_3CH_2CO_2H$ **(1)**
(2 marks)

(ii) Potassium/sodium dichromate *OR* potassium manganate **(1)**
Sulphuric acid *ONLY* **(1)**
ACCEPT correct formulae ie $KMnO_4$, $K_2Cr_2O_7$, H_2SO_4 **(2 marks)**

(iii) Orange *NOT* yellow *OR* purple **(1)**
to green to colourless **(1)**
Colours must relate to an answer in (ii)
Correct colours wrong way round **(0)**
(2 marks)

(iv) Suitable flask containing reagents **(1)**
Reflux condenser **(1)**
Water flow and jacket **(1)**
Heat **(1)**
-1 *for poor diagram eg condenser and flask being integrated,*
-1 *for closed apparatus*

(4 marks)

(v) (fractional) distillation **(1 mark)**

TOTAL 16 Marks

6. (a) NH_3 (aq) + HNO_3 (aq) → NH_4NO_3 (aq)

Formulae **(1)**

state symbols *mark dependent on correct formulae* **(1)**

ACCEPT $NH_4OH(aq) + HNO_3(aq) \rightarrow NH_4NO_3(aq) + H_2O(l)$ **(2)**

(2 marks)

(b) Neutralisation *OR* acid/base **(1 mark)**

(c) *A method to establish neutrality* **(1)**

Further correct detail **(1)**

Eg

Add excess NH_3

and then heat to drive it off.

OR Use suitable indicator to determine end point **(1)**

and then repeat without indicator to obtain colourless solution. **(1)**

(2 marks)

(d) Heat to reduce volume **(1)**

Cool/leave to crystallise/ allow water to evaporate without heat **(1)**

Filter/decant/pick out crystals/ **(1)**

Dry between (filter) papers *NOT* ovens **(1)**

(4 marks)

Total 9 Marks

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7. (a) (+) 12 600 (J) **(1 mark)**
ALLOW 12.6 kJ (*only if kJ units given*)
kJ mol^{-1} **(0)**

(b) 12 600 = 200 × 4.2 × t **(1)** *ie method mark* → t = 15 *ALLOW* T.E.
∴ final temperature = 5 (°C) *OR* 278 K **(1)**
(2 marks)

(c) *Look for 2 distinct advantages*

Easily portable
Can be stored until required
Will keep for months
No freezer required
Fits better to the injury
} ***Any two*** **(2 marks)**

NOT colder/warmer
NOT statements about cold burns

Total 5 Marks

8. (a) (2x14) + (4x1) + (3x16) = 80 **(1 mark)**

(b) $\frac{20}{80} = \frac{1}{4}\text{ mol}$ **(1)**

$\therefore \frac{1}{4} \times 24 = 6\,\text{dm}^3$ *ALLOW T.E* **(1)**

OR 6000 cm^3

Units required

(2 marks)

(c) (i) $2N_2 + 3O_2 + 4H_2$ **(1 mark)**

(ii) $\Delta H^{\ominus}_{\text{reaction}} = -(-365.6 \times 2) + (-241.8 \times 4)$

= -236 kJ (mol^{-1}) **(3)**

-236 **(2)**

Correct application of Hess's Law **(1)**

Using multiples **(1)**

ALLOW – 118 kJ mol^{-1} per mole of NH_4NO_3 if explained

(3 marks)

(d) Reaction **exo**thermic/releases lots of energy **(1)**

Large volume of gas produced/**all** products are gases **(1)**

ACCEPT oxygen produced/liberated (good for combustion) **(2 marks)**

NOT Low activation energy } *no evidence for this in question*

NOT Occurs quickly }

NOT environmental reasons

NOT nitrogen is very stable

Total 9 Marks

END