**Atomic Structure – Homework 4 (Ans)**

**1.** (a) 34 S  **(1)**

16  **(1)** 2

(b) 1s2 2s2 2p6  **(1)** 1

(c) not accelerated  **(1)** 1

(d) 1.65 × 10–24  **(1)**

  **(1)** = 1299  **(1)**

**or** 6.023 × 1023 × 2.158 × 10–23  
= 12.998 **(1)**

any use of 12C & 13C  **(1)**

 **(1)**

= 1201  **(1)** 6

[10]

**2.** (a) *Relative mass* 1 **(1)**

*Relative charge* 0 **(1)** 2

(b) *In common* number of protons (or electrons) **(1)**

*Difference* number of neutrons **(1)** 2

(c) **(1)** K **(1)** 2

(d) (i) *Measurement 1* M/Z **(1)**

*Measurement 2* relative abundance **(1)**

(ii) charged (or negative) plate

creates a current when hit by ion

sends a signal to a computer (or chart recorder)

any 2 points

(iii) same M/Z **(1)** 5

(e) 

6 electrons **(1)**

correct arrangement **(1)** 2

(f) 1s2 2s2 **(1)** 1

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**3.** (a) Na(g)  Na+(g) + e–  
OR Na(g) + e–  Na+(g) + 2e–

(-) on electron not essential  
equation (1)  
state symbols (1)  
Ignore state symbols on electrons

2

(b) *Trend* : Increases **(1)**

*Explanation* : Increased nuclear charge or proton number **(1)**Stronger attraction (between nucleus and (outer) e–) **(1)**

Trend wrong  
Allow M2 only if M3 correct (con)

3

(c) *How values deviate from trend*: (both values) too low **(1)**  
*Explanation for Al*: e– removed from (3) p **(1)** e– or orbital is higher in energy level or better  
 shielded than (3)**s  
 or** p electron is shielded by 3s electrons **(1)**

Allow e– is further away

Mark independently

*Explanation for S*: e– removed from (3)p electron pair **(1)** repulsion between paired e– (reduces energy required) **(1)**

Mark separately  
If deviation wrong allow M2 and M4  
If M3 and / or M5 right 0 (con)  
If used ‘d’ rather than ‘p’ orbital - lose M2 + M4 but may get M3, M5 (explanation marks)

5

[10]

**A = 27 D = 18**

**B = 24 E = 15**

**C = 21**