QUICK CHECK — IONISATION ENERGIES

1 Give the full electron configuration of the following atoms and ions.

a F atom **$1s^2\ 2s^2\ 2p^5$** (1)

b V atom **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^3$** (1)

c V^{3+} ion **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^2$** (1)

2 Write an equation, including state symbols, to represent the following ionisation energies:

a 1st ionisation energy of potassium **$K(g) \rightarrow K^+(g) + e^-$** (1)

b 2nd ionisation energy of potassium **$K^+(g) \rightarrow K^{2+}(g) + e^-$** (1)

3 Which group is the following element in? **group 6** (1)

Ionisation energy	1st	2nd	3rd	4th	5th	6th	7th	8th
kJ mol^{-1}	1310	3390	5320	7450	11000	13300	71000	84100

4 Which element in each of the following pairs has the highest 1st ionisation energy? Explain your answer in each case.

a Na or Mg

- **Mg**
- **Mg has more protons**
- **and smaller atomic radius** (3)

b P or S

- **P**
- **in S electron lost from orbital with 2 e^- but in P lost from orbital with 1 e^-**
- **more e^- – e^- repulsion in S** (3)

c Ne or Ar

- **Ne**
- **Ar has bigger atomic radius**
- **and more shielding** (3)

d Be or B

- **Be**
- **in Be electron lost from s orbital but in B lost from p orbital**
- **p orbital higher energy than s orbital** (3)