

Answers to 1.4 exercises

1.4 Exercise 1

1.
 - a) decreases
proton number increases
shielding stays the same
so attraction to nucleus increases
 - b) increases
proton number increases
shielding stays the same
so attraction to nucleus increases
so more energy required to remove electron
 - c) increases
proton number increases
shielding stays the same
so ability to attract electrons in a covalent bond increases
 - d) increases
size of ions decreases
and charge on ions increases
so attraction between ions and delocalised electrons increases
so more energy is required to separate them
 - e) increases
number of delocalised electrons per atom increases
so more electrons are free to move
2.
 - a) Si has a giant covalent structure
every Si atom attached to 4 others by covalent bonds
the covalent bonds are strong
so a lot of energy is required to break them
 - b) P is simple molecular
Van der Waal's forces between P molecules are weaker
Than covalent bonds between Si atoms
So much less energy is required to break them
 - c) Phosphorus contains P molecules
which have a smaller surface area and less electrons
than the S molecules in sulphur
so the Van der Waal's forces are weaker in phosphorus
and less energy is required to overcome them
 - d) Chlorine contains Cl molecules
which have a smaller surface area and less electrons
than the S molecules in sulphur
but a larger surface area and more electrons
than the Ar atoms in argon
so the energy required to separate Cl molecules is greater
than the energy needed to separated Ar atoms but less
than the energy needed to separated S molecules

e) neither silicon or sulphur contain ions or free electrons