

Unit 1 Elements test

Go to question:

- 1  Which element is a solid at room temperature and consists of discrete molecules?
- 2  Which of the following describes the solid form of Argon?
- 3  Which two elements exist as covalent networks?
- 4  Which element would require the most energy to convert one mole of gaseous atoms into gaseous ions carrying two positive charges?
- 5  Fullerenes differ from diamond because?
- 6  The difference between the atomic size of chlorine and oxygen is mainly due to the difference in?
- 7  Which equation represents the first ionisation energy of a monatomic element?
- 8  Which type of bonding can be described as intra-molecular?



1 Which element is a solid at room temperature and consists of discrete molecules?

a Silicon

b Phosphorus

c Carbon

d Bromine



a hint!!!!

1st hint

Bonds between the molecules must be considered.



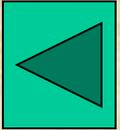
2nd hint

Carbon and silicon have high m.p.'s



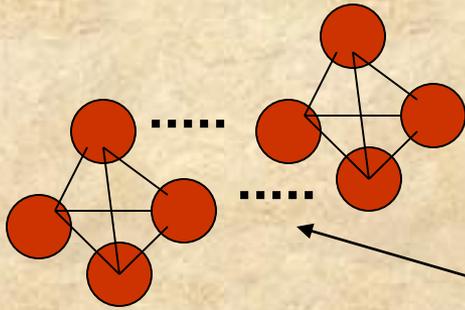
a hint!!!!

Bromine is a liquid at room temperature, so what intermolecular bonds might it have?



Which element is a solid at room temperature and consists of discrete molecules?

Correct because....



Phosphorus molecules have van der Waals' forces between them which have sufficient strength to hold the molecules in a solid state.

A temperature of 50°C would supply sufficient energy to break some of these bonds and so melt it.



2 Which of the following describes the solid form of Argon?

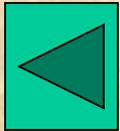
- a It has covalent bonding.
- b It conducts electricity
- c Van der waals' forces exist.
- d It has a network structure



a hint!!!!

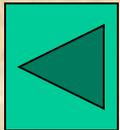
1st hint

Argon is a noble gas, so is monatomic



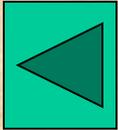
2nd hint

Intra-molecular bonds between the argon atoms need to be able to hold atoms together as a solid.



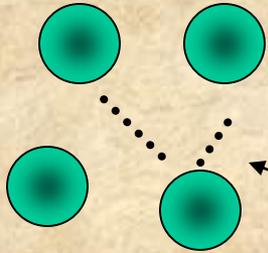
a hint!!!!

You need free electrons which can move for conduction to occur. Do argon atoms have free electrons?

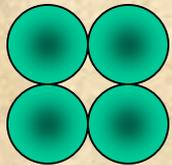


Which of the following describes the solid form of Argon?

Correct because.....



Argon **atoms** have Van der Waals' forces between them which have sufficient strength to hold the molecules in a state at very low temperature.



3 Which two elements exist as covalent networks?

a Na and Mg

b S and P

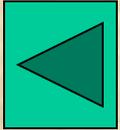
c He and Kr

d C and Si



a hint!!!!

Consider non-metals as this is not metallic bonding



a hint!!!!

Which pair only melt when covalent bonds are broken.
P and S have covalent bonding only within the molecule?



a hint!!!!

Which pair only melt when covalent bonds are broken,
He and Kr have Van der Waals' forces between molecules?

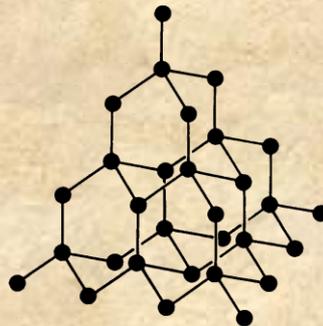


Which two elements exist as covalent networks?

Correct because.....

In both diamond and silicon the atoms are held together by covalent bonding.

There are many many covalent bonds in these atoms. Hence the term covalent network.



4 Which element would require the most energy to convert one mole of gaseous atoms into gaseous ions carrying two positive charges?

a Scandium

b Titanium

c Vanadium

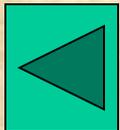
d Chromium



a hint!!!!

1st hint

Use your data book, page 10.



2nd hint

Look at the the values for the first and second ionisation energies.



Which element would require the most energy to convert one mole of gaseous atoms into gaseous ions carrying two positive charges?

Correct because.....

$$\text{Sc} \quad 637 + 1250 = 1887 \text{ kJ/mol}^{-1}$$

$$\text{Ti} \quad 664 + 1320 = 1984 \text{ kJ/mol}^{-1}$$

$$\text{V} \quad 656 + 1430 = 2086 \text{ kJ/mol}^{-1}$$

$$\text{Cr} \quad 659 + 1600 = 2259 \text{ kJ/mol}^{-1}$$



5 Fullerenes differ from diamond because?

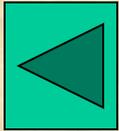
- a Diamond, unlike fullerenes has a covalent network Structure.
- b Fullerenes have a higher melting point than diamond
- c Each carbon in diamond is bonded to another carbon
- d Fullerenes can conduct heat.



a hint!!!!

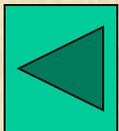
1st hint

Which of the two could be considered as a single molecule?



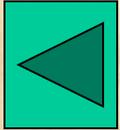
2nd hint

Why does diamond have a very high m.p.?



a hint!!!!

Diamond can conduct heat



Fullerenes differ from diamond because?

Correct because...

Diamond could be considered as a giant molecule. Each carbon being bonded to another by covalent bonds. Fullerenes are made from many discrete molecules.



6 The difference between the atomic size of oxygen and fluorine is mainly due to the difference in.

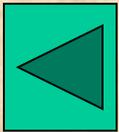
- a Number of protons
- b Number of electron
- c Mass of each atom
- d Number of neutrons



a hint!!!!

1st hint

What forces pull the electrons in towards the nucleus?



2nd hint

What number increases as you go across the group?



a hint!!!!

What charge has a neutron and how might this affect the electrons?



The difference between the atomic size of oxygen and fluorine is mainly due to the difference in?

Correct because....

As the number of protons increase, so does overall nuclear charge. This has the effect of pulling the orbital electrons closer to the nucleus, and so the atomic size is reduced.

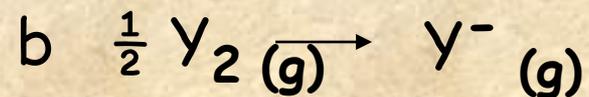
Atomic size decreasing



	H							He
Li	Be		B	C	N	O	F	Ne
Na	Mg		Al	Si	P	S	Cl	Ar
K	Ca							

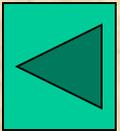


7 Which equation represents the first ionisation energy of a monatomic element?



a hint!!!!

What charge will the ion become when an electron is removed?



a hint!!!!

What state must the atom be in before an electron is removed?



Which equation represents the first ionisation energy of a monatomic element?

Correct because.....

Ionisation energy is defined as *"the amount of energy required to remove to infinity, one mole of electrons from one mole of **gaseous** atoms or ions, the whole process being measured under standard conditions of temperature and pressure"*.



8 Which type of bonding can be described as inter-molecular?

a Ionic Bonding

b Van der Waals'

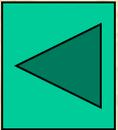
c Covalent

d Metallic



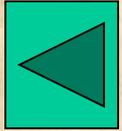
a hint!!!!

Which involve molecules, not ions?



a hint!!!!

Covalent bonding exist within molecules



a hint!!!!

Metallic bonding occurs within the metal



Which type of bonding can be described as inter-molecular?

Correct because....

The type of bonding that occurs between molecules can be hydrogen bonding, polar-polar bonding and Van der waals' forces

