CHEMISTRY ONLINE
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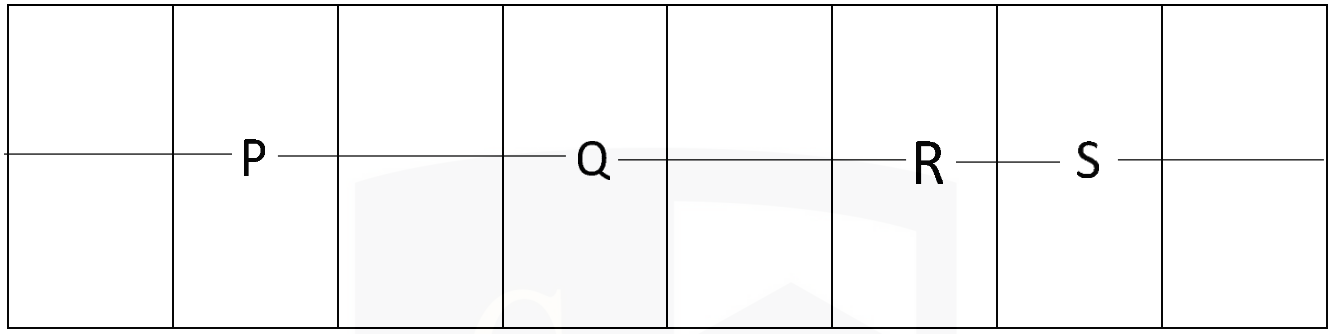
CHEMISTRY

MULTIPLE CHOICE - 6

CHEMICAL BONDING

Chemical Bonding - 6

1. The grid represents two periods of the Periodic Table, for the elements 3 to 18.



An element form one group P, Q, R or S, reacts with an element form another of these groups to produce a compound with a giant covalent structure.

Which are the two groups?

(A) P and R (B) Q and R (C) Q and S (D) R and S

2. Three substances, R, S, T, have physical properties as shown.

Substance	Mp/°C	Bp/°C	Electrical conductivity	
			Of solid	Of liquid
R	801	1413	Poor	Good
S	2852	3600	Poor	Good
T	3550	4827	Good	Not known

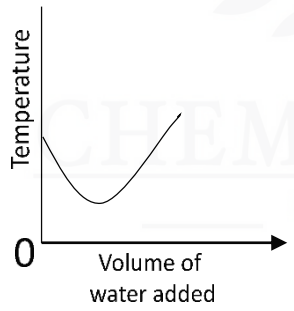
What could be the identities of R, S and T?

	R	S	T
A	NaF	KCl	Cu
B	NaBr	BaO	SiO_2
C	NaCl	MgO	
D	C[graphite]		
	NaBr	CaO	
	C[diamond]		

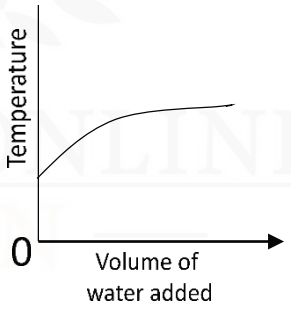
3. When water is stirred with glucose, strong hydrogen bonds are initially formed between glucose molecules and water molecules, but as more water is added, these hydrogen bonds are broken.

Which graph best represents the observed temperature changes?

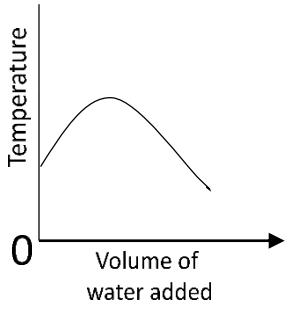
(A)



(B)



(C)



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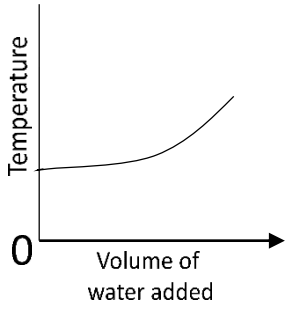
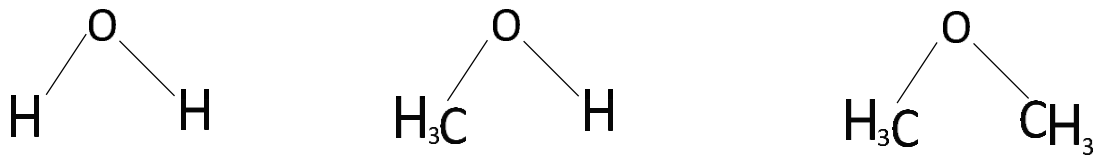


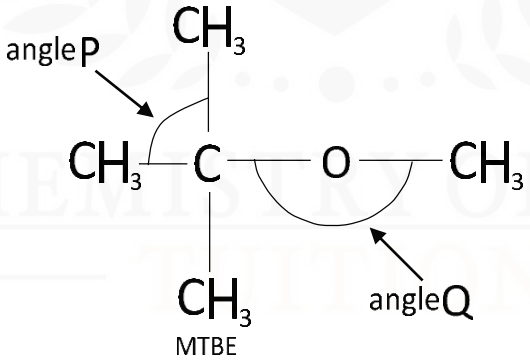
4. Water, methanol and methoxymethane, CH_3OCH_3, have similarly shaped molecules.



What is the strongest intermolecular force in water, methanol and methoxymethane?

	H_2O	CH_3OH	CH_3OCH_3
(A)	Hydrogen bonds	Hydrogen bonds	Permanent dipoles
(B)	Hydrogen bonds	Hydrogen bonds	Induced dipoles
(C)	Permanent dipoles	Permanent dipoles	Induced dipoles
(D)	Hydrogen bonds	Permanent dipoles	Induced dipoles

5. MTBE is a constituent of petrol.



MTBE

What are the values of angle *P* and angle *Q* in a molecule of MTBE?

	Angle *P*	Angle *Q*
A	90°	105°
B	90°	180°
C	109°	105°
D	109°	180°

6. Ethanol is much more stable in water than is ethyl ethanoate. Which one of the following statements correctly accounts for this?

(A) Ethanol is a polar molecule, but ethyl ethanoate is non-polar.

(B) Ethanol is a non-polar molecule, but ethyl ethanoate is polar.

(C) A hydrogen bond forms between the hydrogen of the –OH group in ethanol and the oxygen of a water molecule.

(D) A hydrogen bond forms between the hydrogen of the –OH group in ethanol and the hydrogen of a water molecule.

7. Covalent bonds are formed by orbital overlap. The shape of unsaturated hydrocarbon molecules can be explained in terms of hybridization of orbitals.

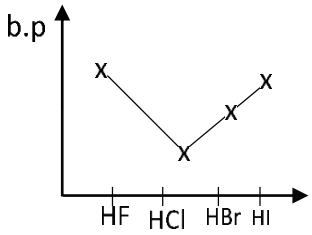
Which bond is not present in

HC=CCH2CH=CH2?

(A) a π bond formed by $2p - 2p$ overlap (C) a σ bond formed by $2sp^2$ overlap

(B) a σ bond form by $1s - 2sp$ overlap (D) a σ bond formed by $2sp^2 - 2sp^2$ overlap

8. The diagram shows the variation of the boiling points of the hydrogen halides.



What explains the higher boiling point of hydrogen fluoride?

(A) The bond energy of HF molecules is greater than in other hydrogen halides.

(B) The effect of nuclear shielding is much reduced in fluorine which polarizes the HF molecule.

(C) The electronegativity of fluorine is much higher than for other elements in the group.

(D) There is hydrogen bonding between HF molecules.

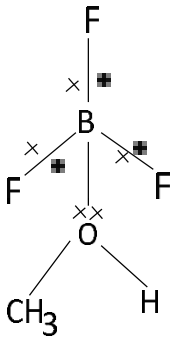
(E)

9. $BF_3.CH_3OH$ is a reagent used to form methyl esters from compounds containing acyl groups.

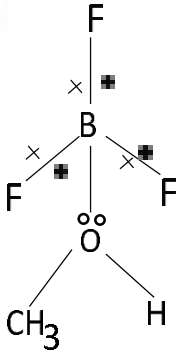
In the diagrams, x, . and O represent electrons from B, F and O, respectively.

Which tetrahedral structure illustrates the electron pairs around the boron atom?

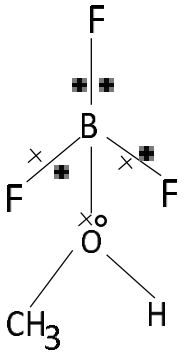
(A)



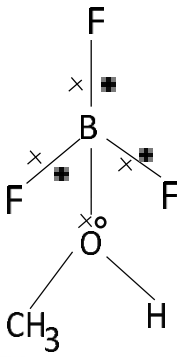
(B)



(C)



(D)



10. The boiling point of water (100 °C) is greater than that of HF (20 °C).

Which statement is a correct explanation of this?

(A) Each hydrogen bond formed between water molecules is stronger than that formed between HF molecules.

(B) There are more atoms in a water molecule than there are in an HF molecule, so van der Waals' forces are stronger in water.

(C) There are, on average, more hydrogen bonds between water molecules than there are between HF molecules.

(D) The water molecule has a greater permanent dipole than the HF molecule.

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