

Topics 2.1 – 2.4: MCQ Practice

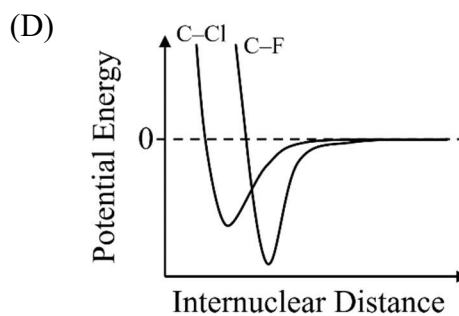
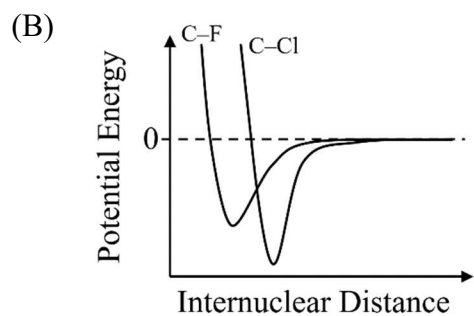
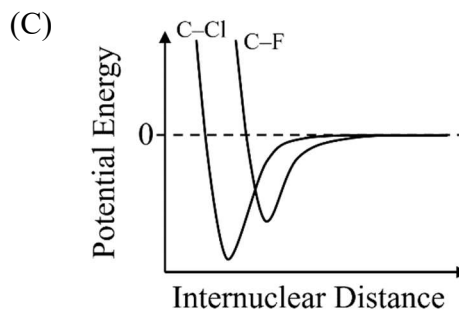
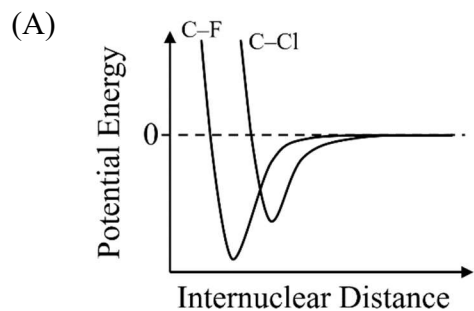
BaCl₂, CdCl₂, SCl₂

1. Which of the following correctly ranks the substances listed above in order of increasing ionic character in their bonding?
 - (A) SCl₂, BaCl₂, CdCl₂
 - (B) SCl₂, CdCl₂, BaCl₂
 - (C) BaCl₂, CdCl₂, SCl₂
 - (D) BaCl₂, SCl₂, CdCl₂

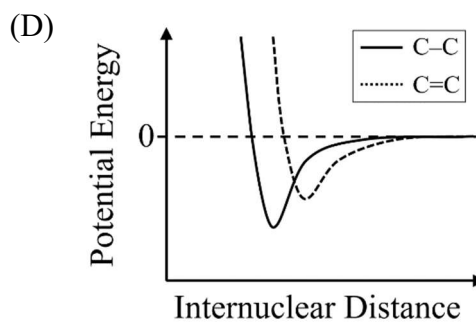
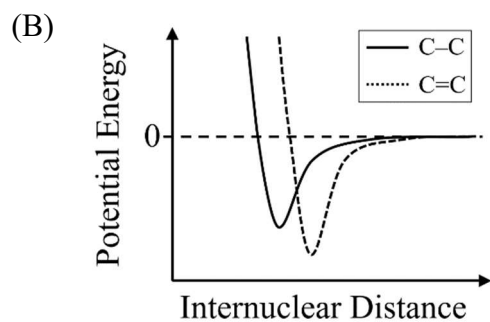
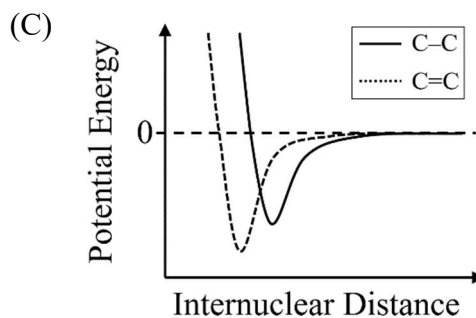
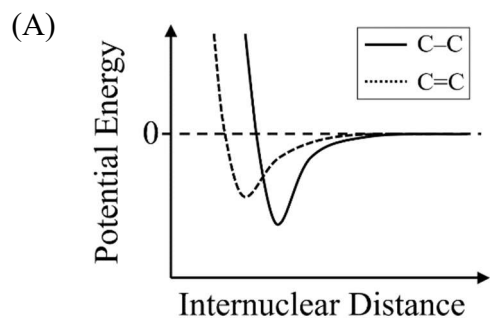
2. Which of the following has the bonds arranged in order of increasing polarity?
 - (A) Al–Cl < P–Cl < Cl–Cl
 - (B) S–S < Al–S < P–S
 - (C) Si–O < Si–C < Si–F
 - (D) Se–Br < Se–Cl < Se–F

3. The lattice energy of a salt is related to the energy required to separate the ions. For which of the following pairs of ions is the energy that is required to separate the ions largest? (Assume that the distance between the ions in each pair is equal to the sum of the ionic radii.)
 - (A) Na⁺ and Cl⁻
 - (B) K⁺ and Cl⁻
 - (C) Mg²⁺ and O²⁻
 - (D) Ca²⁺ and O²⁻

4. Which of the following diagrams correctly shows the potential energy as a function of internuclear distance for the carbon-fluorine bond and the carbon-chlorine bond?



5. Which of the following diagrams correctly shows the potential energy as a function of internuclear distance for the carbon-carbon single bond and the carbon-carbon double bond?

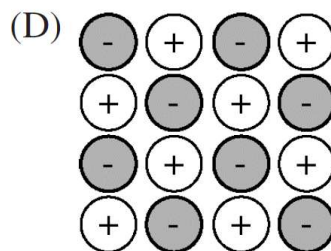
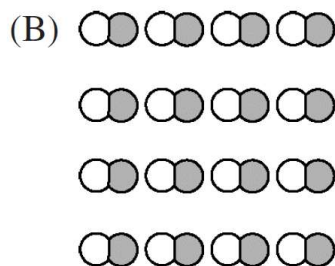
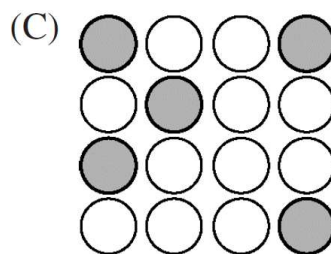
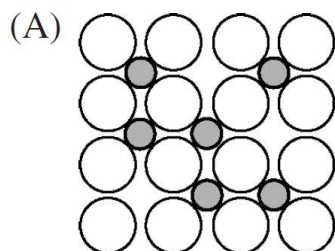


| Reaction | Lattice Energy (kJ/mol) |
|--|-------------------------|
| $\text{NaCl}(s) \rightarrow \text{Na}^+(g) + \text{Cl}^-(g)$ | 788 |
| $\text{NaBr}(s) \rightarrow \text{Na}^+(g) + \text{Br}^-(g)$ | ? |

6. The energy required to separate the ions in the NaCl crystal lattice into individual $\text{Na}^+(g)$ and $\text{Cl}^-(g)$ ions, as represented in the table above, is known as the lattice energy of $\text{NaCl}(s)$. Which of the following shows the correct prediction for the lattice energy of $\text{NaBr}(s)$ and gives the correct justification?

| | Lattice Energy of $\text{NaBr}(s)$ | Justification |
|-----|------------------------------------|---|
| (A) | less than 788 kJ/mol | The ionic radius of Br^- is smaller than that of Cl^- , and the coulombic attractions between the ions in NaBr are weaker than they are in NaCl . |
| (B) | less than 788 kJ/mol | The ionic radius of Br^- is larger than that of Cl^- , and the coulombic attractions between the ions in NaBr are weaker than they are in NaCl . |
| (C) | greater than 788 kJ/mol | The ionic radius of Br^- is smaller than that of Cl^- , and the coulombic attractions between the ions in NaBr are stronger than they are in NaCl . |
| (D) | greater than 788 kJ/mol | The ionic radius of Br^- is larger than that of Cl^- , and the coulombic attractions between the ions in NaBr are stronger than they are in NaCl . |

7. Which of the following diagrams best depicts an alloy of Ni and B?

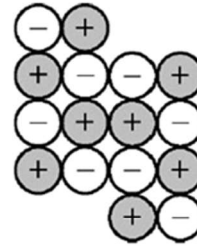
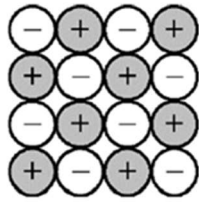


8. Which of the following diagrams best illustrates how a displacement in an ionic crystal results in cleavage and brittleness?

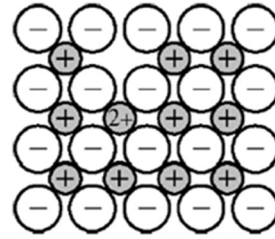
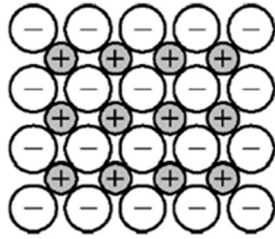
Before Displacement

After Displacement

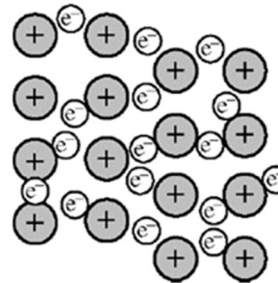
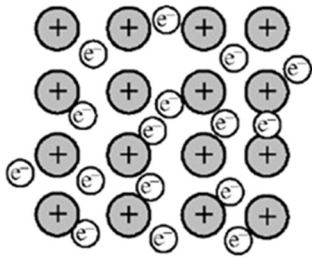
(A)



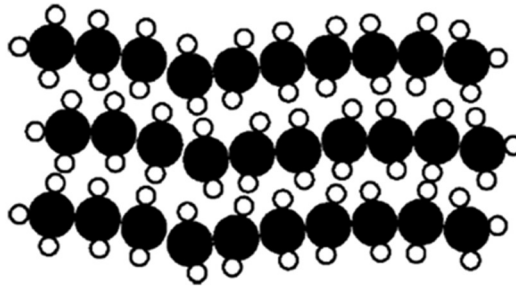
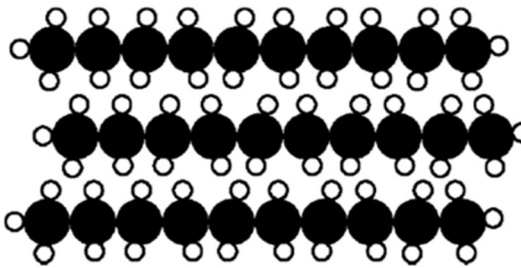
(B)



(C)



(D)



| Element | Atomic Radius (pm) |
|---------|--------------------|
| Pd | 140 |
| Au | 135 |

9. White gold is a common alloy of gold (Au) and palladium (Pd) that is often used in jewelry. The atomic radii of the metals are given in the table above. A particular ring is made from an alloy that is 25 mole percent Pd and 75 mole percent Au. Which of the following represents the correct particulate diagram of the solid alloy?

