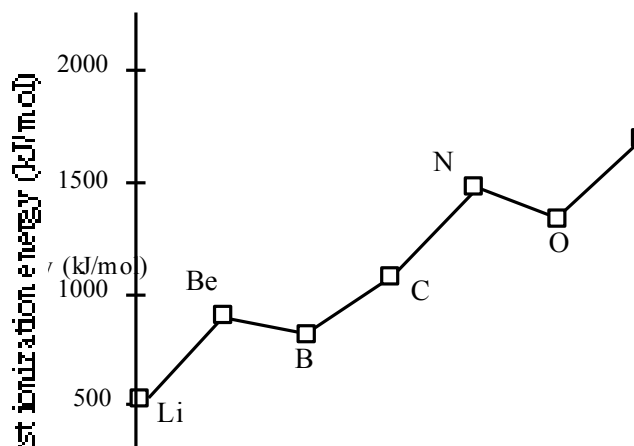


1990 D



The diagram shows the first ionization energies for the elements from Li to Ne. Briefly (in one to three sentences) explain each of the following in terms of atomic structure.

- In general, there is an increase in the first ionization energy from Li to Ne.
- The first ionization energy of B is lower than that of Be.
- The first ionization energy of O is lower than that of N.
- Predict how the first ionization energy of Na compares to those of Li and of Ne. Explain.

1993 D

Account for each of the following in terms of principles of atom structure, including the number, properties, and arrangements of subatomic particles.

- The second ionization energy of sodium is about three times greater than the second ionization energy of magnesium.
- The difference between the atomic radii of Na and K is relatively large compared to the difference between the atomic radii of Rb and Cs.
- A sample of nickel chloride is attracted into a magnetic field, whereas a sample of solid zinc chloride is not.
- Phosphorus forms the fluorides PF_3 and PF_5 , whereas nitrogen forms only NF_3 .

1994 D

Use principles of atomic structure and/or chemical bonding to answer each of the following.

- The radius of the Ca atom is 0.197 nanometer; the radius of the Ca^{2+} ion is 0.099 nanometer. Account for this difference.
- The lattice energy of $\text{CaO}(s)$ is -3,460 kilojoules per mole; the lattice energy for $\text{K}_2\text{O}(s)$ is -2,240 kilojoules per mole. Account for this difference.

	Ionization Energy (kJ/mol)	
	First	Second
K	419	3,050
Ca	590	1,140

- Explain the difference between Ca and K in regard to
 - their first ionization energies,
 - their second ionization energies.
- The first ionization energy of Mg is 738 kilojoules per mole and that of Al is 578 kilojoules per mole. Account for this difference.