

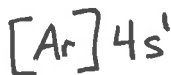
Multiple Choice Review: Periodic Table

1. A solid element has two valence electrons. That element must be a member of the
- (a) halogens
 - (b) noble gases
 - (c) radioactive elements
 - (d) alkali metals
 - (e) alkaline earth metals

2. Which set of elements is expected to have very similar properties?
- (a) S, Se, Si
 - (b) Ne, Na, Mg
 - (c) O, S, Se
 - (d) N, O, F
 - (e) Na, Mg, K

elements within the same group
show similar properties

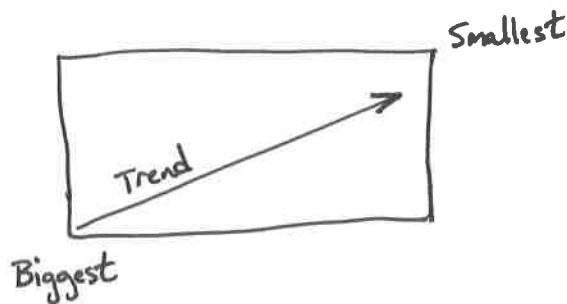
3. Which of the following elements is expected to have the largest second ionization energy?
- (a) Ge
 - (b) K
 - (c) Ca
 - (d) Ga
 - (e) Se



easy to lose the first electron
but requires large amount of
energy to "crack into" the
stable octet

4. Most elements in the periodic table are
- (a) metals
 - (b) nonmetals
 - (c) liquids
 - (d) gases
 - (e) metalloids

5. Which statement below is true?
- (a) Potassium atoms are larger than calcium atoms.
 - (b) Sodium atoms are larger than potassium atoms.
 - (c) Chlorine atoms are larger than sulfur atoms.
 - (d) Magnesium atoms are larger than sodium atoms.
 - (e) Oxygen atoms are larger than nitrogen atoms.



6. Which of the following is LEAST likely to be a metalloid?
- (a) As
 - (b) Hg
 - (c) Ge
 - (d) Si
 - (e) Sb

7. The ionization energies (in kJ/mole) for a certain element are listed below.

First	Second	Third	Fourth	Fifth
738	1,451	7,733	10,543	13,630

Based on this ionization energy table, the elements is most likely to be:

- (a) Na
- (b) Al
- (c) C
- (d) Mg
- (e) N

Large increase in energy needed to remove the third electron.

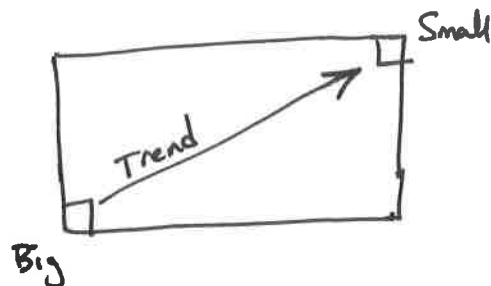
8. When neutral, how many valence electrons do the halogens possess?

- (a) two
- (b) three
- (c) five
- (d) seven
- (e) eight

Group VIIA with seven valence electrons

9. Atomic radius generally increases as we move _____.

- (a) up a group
- (b) up a group and from left to right across a period
- (c) from left to right across a period
- (d) down a group and from left to right across a period
- (e) down a group and from right to left across a period



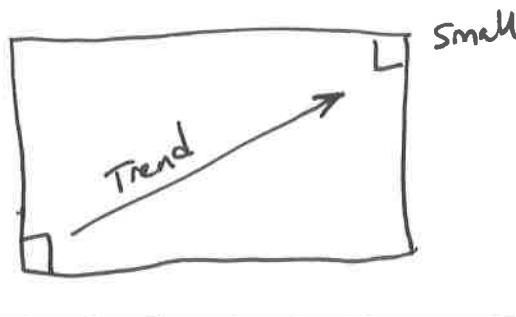
10. Which of the following lists corresponds to the first five ionization energies (in kJ/mole) for silicon?

	First	Second	Third	Fourth	Fifth
(a)	780	13,675	14,110	15,650	16,100
(b)	780	1,575	14,110	15,650	16,100
(c)	780	1,575	3,220	15,650	16,100
<input checked="" type="radio"/> (d)	780	1,575	3,220	4,350	16,100
(e)	780	1,575	3,220	4,350	5,340

Silicon has 4 valence electrons so large jump expected between 4th + 5th electrons

11. Which of the following atoms has the largest atomic radius?

- (a) S
- (b) F
- (c) O
- (d) Ne
- (e) Cl



12. Which equation correctly represents the first ionization of aluminum?

- (a) $\text{Al}^{1+} + \text{e}^{-} \rightarrow \text{Al}^0$
- (b) $\text{Al}^{1-} \rightarrow \text{Al}^0 + \text{e}^{-}$
- (c) $\text{Al}^0 \rightarrow \text{Al}^{1+} + \text{e}^{-}$
- (d) $\text{Al}^0 \rightarrow \text{Al}^{1-} + \text{e}^{-}$
- (e) $\text{Al}^0 + \text{e}^{-} \rightarrow \text{Al}^{1-}$

first ionization refers to $M^0 \rightarrow M^{1+} + \text{e}^{-}$

13. Which of the following correctly represents the second ionization of aluminum?

- (a) $\text{Al}^{1+} \rightarrow \text{Al}^{2+} + \text{e}^{-}$
- (b) $\text{Al}^{1+} + \text{e}^{-} \rightarrow \text{Al}^0$
- (c) $\text{Al}^{1-} + \text{e}^{-} \rightarrow \text{Al}^{2-}$
- (d) $\text{Al}^0 \rightarrow \text{Al}^{1+} + \text{e}^{-}$
- (e) $\text{Al}^{1+} + \text{e}^{-} \rightarrow \text{Al}^{2+}$



14. Which of the following traits characterizes the alkali metals?

- (a) smallest atomic radius in each period NO
- (b) the lowest first ionization energies in a period YES
- (c) exist as diatomic molecules NO
- (d) formation of dianions NO
- (e) very high melting points NO

15. Which has the lowest first ionization energy of these five alkali metals: Li, Na, K, Rb, Cs?

- (a) Li
- (b) Na
- (c) K
- (d) Rb
- (e) Cs

the farther the valence electrons are from the nucleus,
the less energy is needed to remove them

"Electrons practically fall off Cs"

16. The electron configuration that is expected to have the lowest first ionization energy is _____.

- (a) $[\text{Kr}] 5s^1$
- (b) $[\text{Ne}] 3s^2 3p^5$
- (c) $[\text{Ar}] 4s^2 3d^{10} 4p^4$
- (d) $[\text{Ne}] 3s^2 3p^6$
- (e) $[\text{Ar}] 4s^1$

It comes down to (a) and (e) as choices here.
The farther from the nucleus, the easier the
electron can be lost, so the correct answer
is (a)

17. The electron configuration that is expected to have the highest first ionization energy is _____.

- (a) $[\text{Kr}] 5s^1$
- (b) $[\text{Ne}] 3s^2 3p^5$
- (c) $[\text{Ar}] 4s^2 3d^{10} 4p^4$
- (d) $[\text{Ne}] 3s^2 3p^6$
- (e) $[\text{Ar}] 4s^1$

Cracking into a full valence shell will
cost you some serious energy!