

- 1) C
- 2) E
- 3) A
- 4) B
- 5) B
- 6) E
- 7) E
- 8) C
- 9) B
- 10) C
- 11) B
- 12) B
- 13) C
- 14) D
- 15) B

16. (4 points each) Provide names for the following compounds:

a) SrS      strontium sulfide

b) Cr<sub>2</sub>O<sub>3</sub>      chromium(III) oxide

17. (4 points each) Provide chemical formulas for the following compounds:

a) potassium nitride      K<sub>3</sub>N      b) tin(IV) bromide      SnBr<sub>4</sub>

18. (4 points each) In each pair, circle the lower energy orbital

3s on Mg   OR   3s on S      5s on Sr   OR   4d on Sr      4s on Ca   OR   4p on Br

19. (5 points each) Write the valence electron configurations of

a Ge atom      4s<sup>2</sup> 4p<sup>2</sup>      an Fe atom      4s<sup>2</sup> 3d<sup>6</sup>

20. (12 points) SET UP the following calculations, showing the conversion factor(s) you would use. You do NOT need to calculate an answer. You will be graded on your set-up.

How many individual atoms are in 12.8 g of Si?

$$12.8 \text{ g} \times \frac{6.02 \times 10^{23} \text{ atoms}}{28.09 \text{ g}}$$

1. Which of the following samples contains the greatest mass?

- A) 1.5 mol of C      B)  $3 \times 10^{23}$  V atoms      C) 1 mol of P      D) 3 mol of Li      E)  $6 \times 10^{23}$  F atoms

2. Which of the following samples contains the least number of atoms?

- A) 1.5 mol of Li      B) 28 g of N      C) 80 g of Br      D) 27 g of Be      E) 0.5 mol of Kr

3. When two like charges interact, which of the following gives the highest energy?

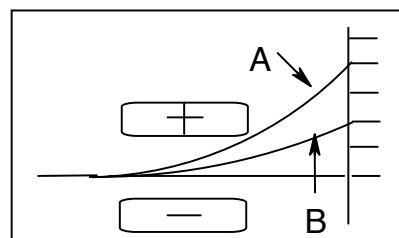
- A) large charges close together  
B) large charges far apart  
C) small charges close together  
D) small charges far apart

4. Which subatomic particles are in the nucleus?

- A) protons and electrons      B) protons and neutrons      C) electrons and neutrons  
D) protons only      E) electrons only

5. The paths of particle A and particle B as they move through an electric field are shown at the right. Which of the following statements could be true about A and B?

- A) if of equal charges, the mass of A is twice the mass of B  
B) if of equal masses, the charge of A is twice the charge of B  
C) both of these statements could be true  
D) neither of these statements could be true



6. The Thomson cathode ray experiment:

- A) measured the mass of the electron  
B) measured the charge of the electron  
C) showed the existence of quantized energy levels  
D) showed the presence of a nucleus in an atom  
E) none of the above

7. What is the symbol of the isotope that contains 22 protons, 26 neutrons and 20 electrons?

- A)  $^{48}\text{Ti}^{2-}$       B)  $^{48}\text{Cd}^{2+}$       C)  $^{22}\text{Ti}^{2+}$       D)  $^{22}\text{Cd}^{2-}$       E) None of these

8. (6 each) Consider the following transitions in the Bohr model of the atom:

- A)  $n = 4 \rightarrow n = 6$       B)  $n = 6 \rightarrow n = 3$       C)  $n = 3 \rightarrow n = 5$       D)  $n = 2 \rightarrow n = 1$

Which corresponds to the absorption process of greatest energy?

9. Blue light has a greater frequency than red light. It also has:

- A) a greater energy and a greater wavelength  
B) a greater energy and a smaller wavelength  
C) a smaller energy and a smaller wavelength  
D) a smaller energy and a greater wavelength

10. What is the highest occupied orbital in a Ta atom?

- A) 3d      B) 4d      C) 5d      D) 6s      E) 6p

11. How many unpaired electrons are present in a Se atom?

- A) 1      B) 2      C) 3      D) 4      E) 0

12. Which statement below best describes what is meant by the phrase “atomic energy levels are quantized”?
- They have non-zero values
  - They occur only at certain discrete energies rather than being continuous
  - The energy levels should be thought of as photons
  - They are evenly spaced
  - The energies have a unit (most commonly Joules)
13. Which of the following statements about levels and sublevels is correct?
- The  $n=3$  level contains two sublevels
  - The  $2s$  sublevel contains two orbitals
  - The  $4p$  sublevel can contain up to six electrons
  - The  $3d$  sublevel contains ten orbitals
  - The  $n=3$  level contains six orbitals
14. Which of the following atoms has the greatest ionization energy?
- A) Al      B) As      C) Mg      D) S      E) Sr
15. Quantum Theory differs from the Bohr model in that:
- Only quantum theory explains the emission spectrum of the hydrogen atom
  - Only quantum theory treats electrons as waves
  - Only quantum theory has different energy levels for different modes of motion
  - Only quantum theory models the atom as a hard sphere
  - Only quantum theory treats the motion of protons

PLACE YOUR ANSWERS FOR #16-20 DIRECTLY ON THIS PAPER

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