Use the particle diagrams to answer Questions #1-4 (NOTE: Question #3 has more than one right answer. Choices may be used more than once.)

1.) Which drawing represents a pure substance?

2.) Which drawing represents a mixture of monatomic elements?

3.) Which drawing represents a mixture of a monatomic element with a diatomic one?

4.) Which drawing represents a compound?

5.) A salt water solution (or any solution in general) is considered a
   (1) element  (2) compound  (3) homogeneous mixture  (4) heterogeneous mixture

6.) A bottle of rubbing alcohol contains both 2-propanol and water. These liquids can be separated by the process of distillation because the 2-propanol and water
   (1) have combined chemically and retain their different boiling points
   (2) have combined physically and retain their different boiling points
   (3) have combined chemically and have the same boiling point
   (4) have combined physically and have the same boiling point

7.) How many molecules are in 3 Ca(NO₃)₂?
   (1) 3  (2) 9  (3) 21  (4) 27

8.) How many atoms are in 3 Ca(NO₃)₂?
   (1) 3  (2) 9  (3) 21  (4) 27

In 1 Ca(NO₃)₂ = 1 Ca, 2N, 6O (1+2+6=9 total atoms); In 3 Ca(NO₃)₂ = 3 Ca, 6N, 18O (27 total atoms)

9.) Which substance can not be decomposed by a chemical change?
   (1) Ne  (2) N₂O  (3) HF  (4) H₂O

10.) Which substance can not be broken down by a chemical reaction?
    (1) ammonia  (2) argon  (3) methane  (4) water
    \(\text{NH}_3, \text{Ar}, \text{CH}_4, \text{H}_2\text{O}\)

11.) In the distillation process, the processes that occur, in order, are:
    (1) boiling, condensation, collection of liquid
    (2) vaporization, collection, condensation
    (3) condensation, vaporization, collection
    (4) collection of liquid, condensation, vaporization
12.) Which statement describes a chemical property that can be used to distinguish between compound A and compound B?

- (1) A is a blue solid, and B is a white solid.
- (2) A has a high melting point, and B has a low melting point.
- (3) A dissolves in water, and B does not dissolve in water.
- (4) A does not burn in air, and B does burn in air.

13.) An example of a physical property of an element is the element’s ability to

- (1) react with an acid (chem)
- (2) react with oxygen (chem)
- (3) form a compound with chlorine (chem)
- (4) form an aqueous solution (phys)

14.) Which two particle diagrams represent mixtures of diatomic elements?

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- (1) A and B  
- (2) B and C  
- (3) A and C  
- (4) B and D

15.) All the techniques for separating mixtures work because of differences in the physical properties of the components.

16.) We have discussed two major techniques for separating components of a mixture from each other, but we have focused on the following two the most.

For each picture below:

a) Identify the separation technique.

b) Describe the property allowing the technique to work.

- a.) distillation
- b.) boiling point

- a.) filtration
- b.) particle size