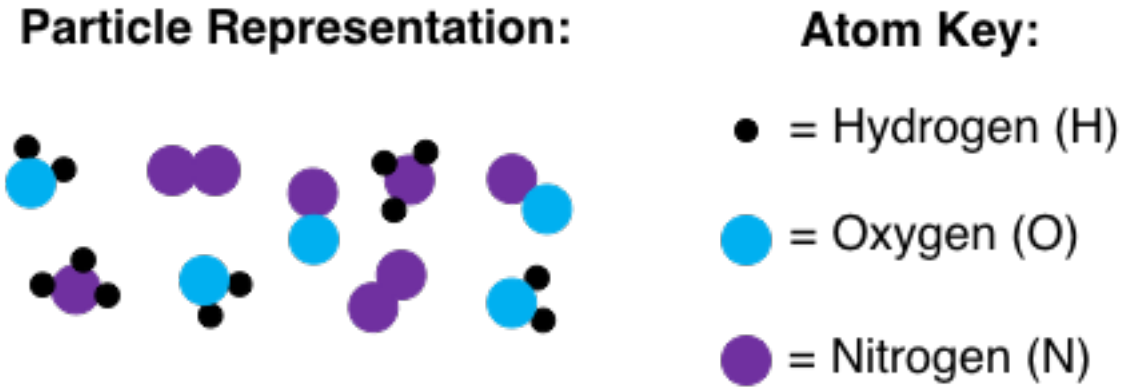
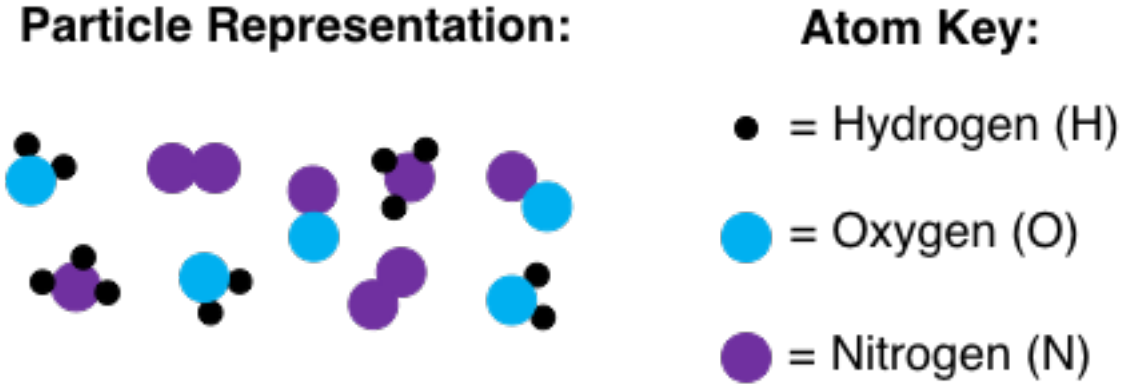
Representations Matter

Apprentice Difficulty Level
Question Group 1
Question 1
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.



There are four atoms of the compound nitrogen.
There are three molecules of the compound water (H_2O).
There are two molecules of the compound ammonia (NH_3).
There are two molecules of the compound nitrogen monoxide (NO).

Question 2
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.



There are four atoms of the compound nitrogen monoxide (NO).
There are three molecules of the compound water (H_2O).
There are two molecules of the compound ammonia (NH_3).
There are two molecules of the element nitrogen.

Question Group 2
Question 3
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

There are three compounds of the element hydrogen.
There are two different compounds in the diagram.
There is a total of 10 molecules in the diagram.
There is one molecule of the element oxygen.

Question 4
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.

Particle Representation:

Atom Key:

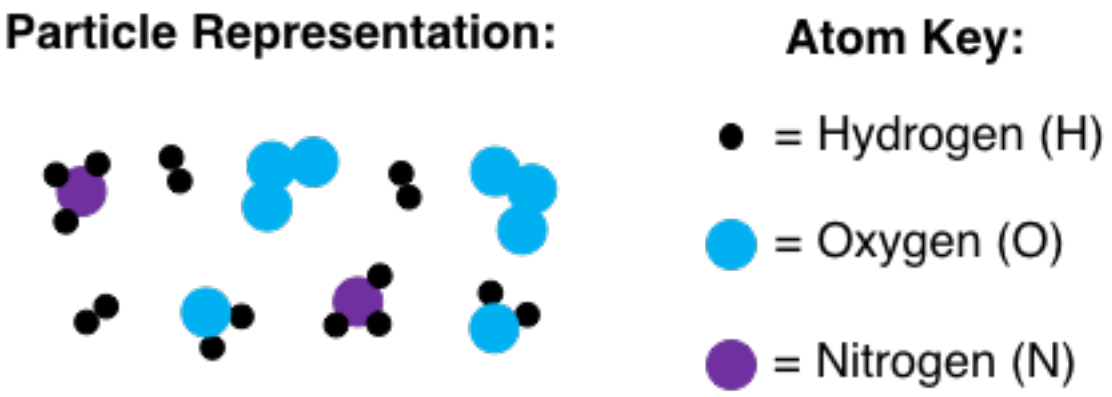
● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

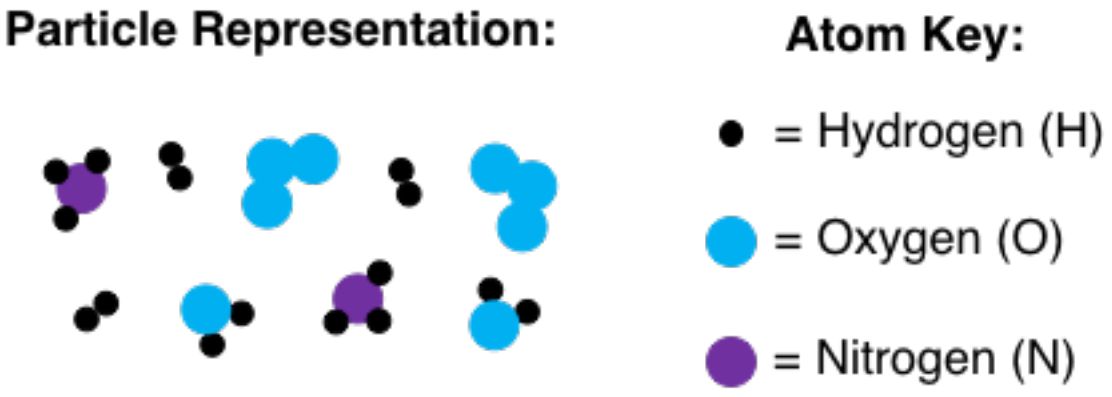
There is only one compound of the element oxygen.
There are two different compounds in the diagram.
There is a total of 10 molecules in the diagram.
There are three molecules of the element hydrogen.

Question Group 3
Question 5
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.



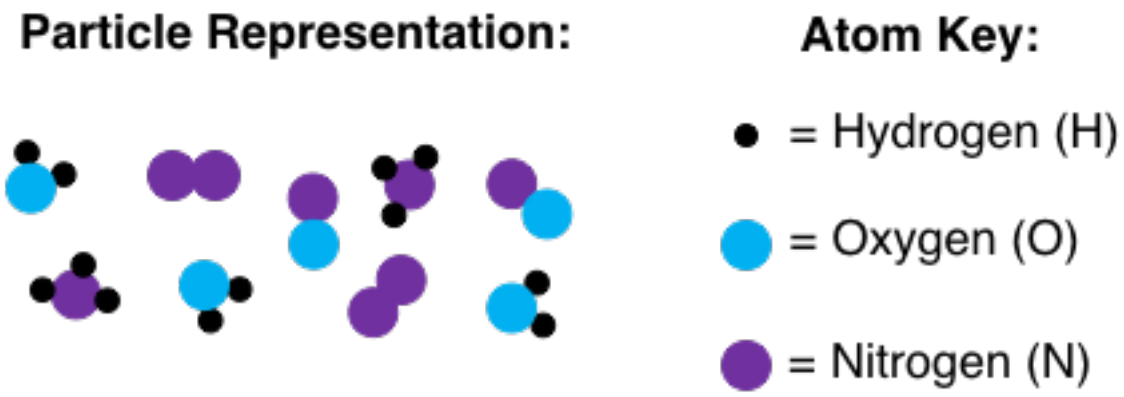
There are three atoms of the element hydrogen.
There are two molecules of the compound water (H_2O).
There are two molecules of the compound ammonia (NH_3).
There are two molecules of the element oxygen.

Question 6
Consider the Particle Representation and accompanying Atom Key. Identify the one statement that does not match the diagram.



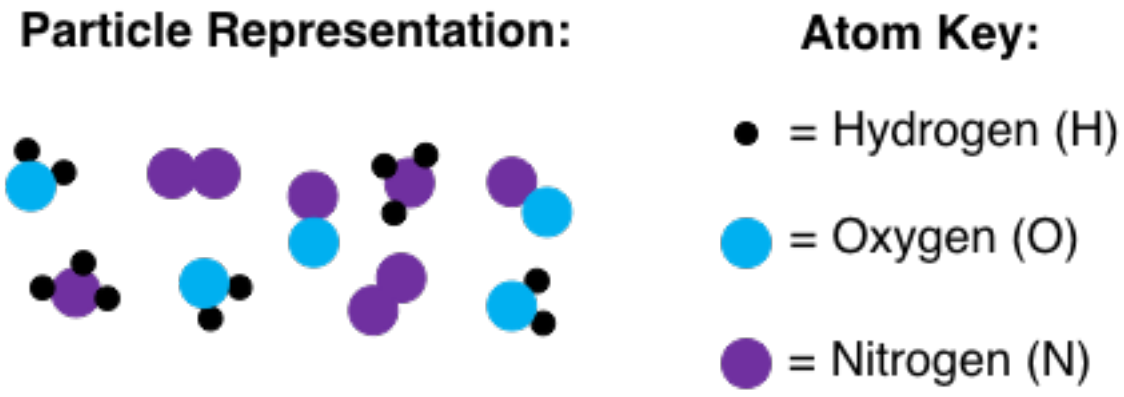
There are two compounds of the molecule water (H_2O).
There are two molecules of the compound ammonia (NH_3).
There are three molecules of the element hydrogen.
There are two molecules of the element oxygen.

Question Group 4
Question 7
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.



2 N_4
3 H_2O
2 NH_3
2 NO

Question 8
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.



N_2O_2
3 H_2O
2 NH_3
2 N_2

Question Group 5
Question 9
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

2 O
3 H_2
3 NO
3 H_2O

Question 10
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

6 H
O_2
3 NO
3 H_2O

Question Group 6
Question 11
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

3 O_2
3 H_2
2 NH_3
2 H_2O

Question 12
Consider the Particle Representation and accompanying Atom Key. Identify the one formula that does not describe the parts of the diagram.

Particle Representation:

Atom Key:

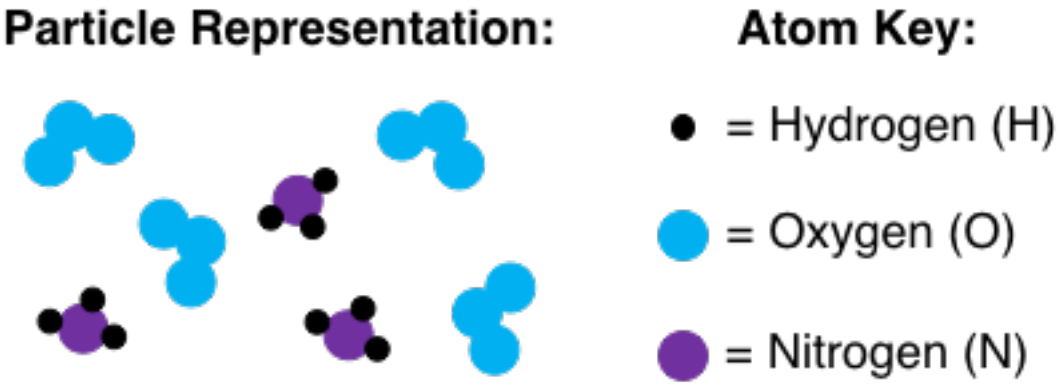
● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

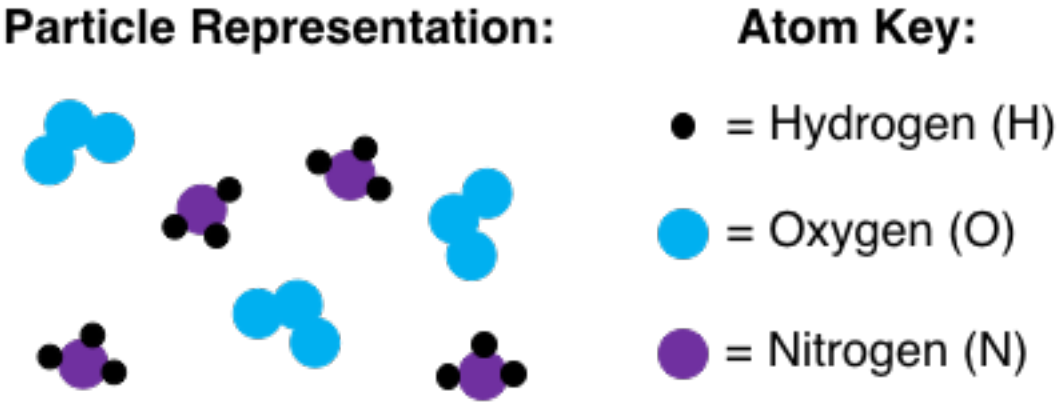
2 H_3
2 O_3
2 NH_3
2 H_2O

Master Difficulty Level
Question Group 7
Question 13
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



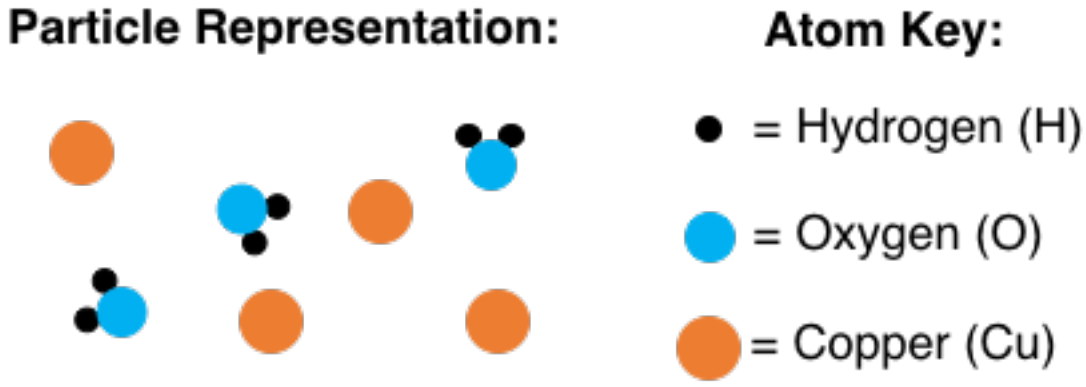
4 molecules of the element oxygen and 3 molecules of the compound ammonia (NH_3)
3 molecules of the element oxygen and 3 molecules of the compound ammonia (NH_3)
4 molecules of the compound oxygen and 3 molecules of the compound ammonia (NH_3)
12 molecules of the element oxygen and 3 molecules of the compound ammonia (NH_3)

Question 14
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



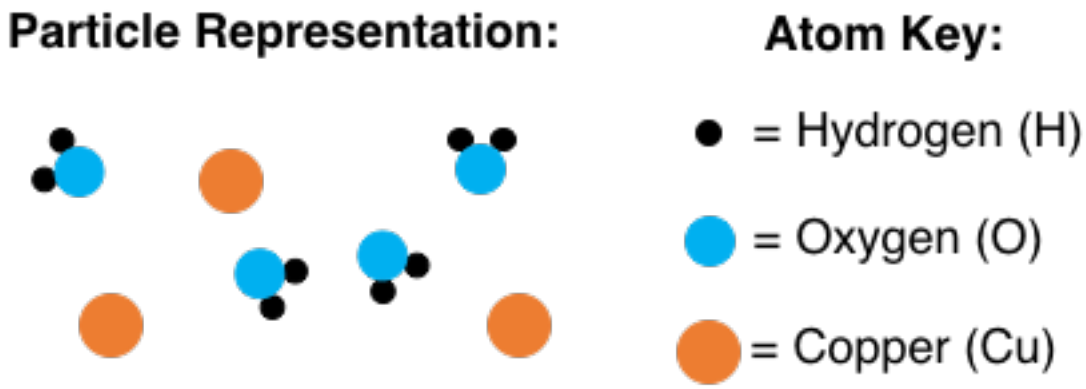
3 molecules of the element oxygen and 4 molecules of the compound ammonia (NH_3)
3 atoms of the element oxygen and 4 molecules of the compound ammonia (NH_3)
3 atoms of the compound oxygen and 4 molecules of the compound ammonia (NH_3)
12 molecules of the element oxygen and 4 molecules of the compound ammonia (NH_3)

Question Group 8
Question 15
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



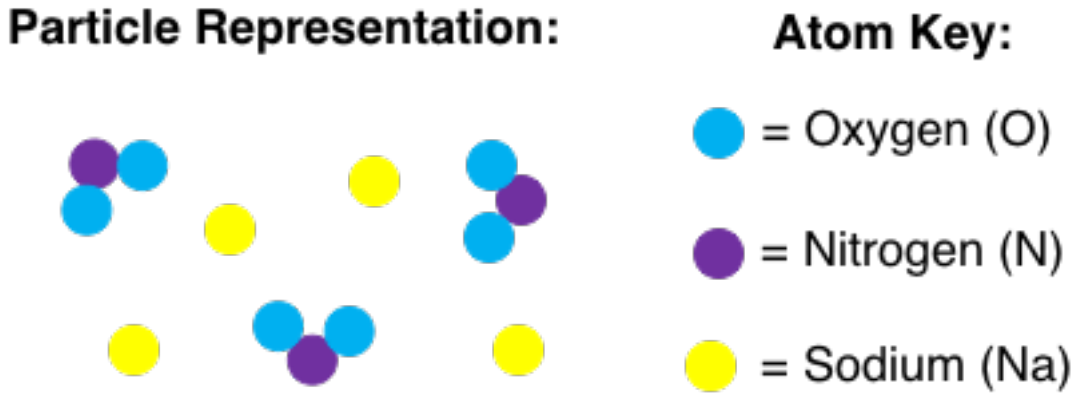
4 atoms of the element copper and 3 molecules of the compound water (H_2O)
4 elements of the atom copper and 3 compounds of the molecule water (H_2O)
4 atoms of the element copper and 3 atoms of compound oxygen and 6 atoms of compound hydrogen
4 elements of copper atoms and 3 molecules of the compound water (H_2O)

Question 16
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



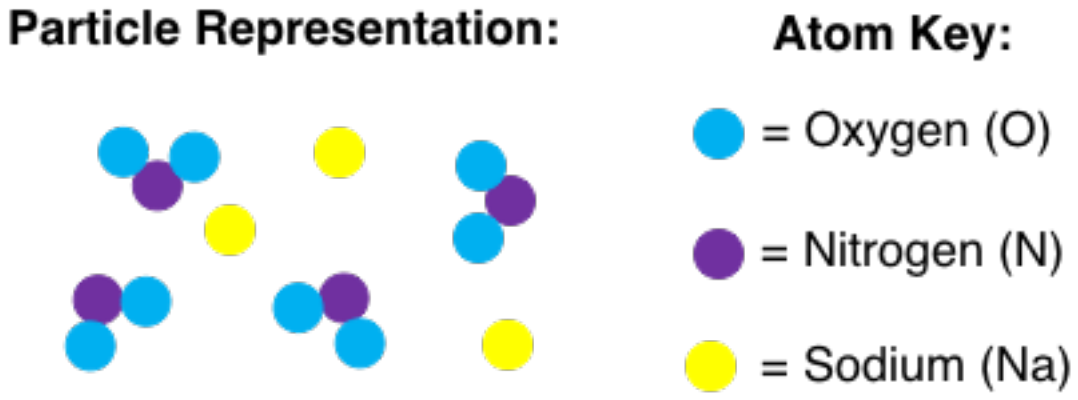
3 atoms of the element copper and 4 molecules of the compound water (H_2O)
3 elements of the atom copper and 4 compounds of the molecule water (H_2O)
3 atoms of the element copper and 4 atoms of compound oxygen and 8 atoms of compound hydrogen
3 elements of copper atoms and 4 molecules of the compound water (H_2O)

Question Group 9
Question 17
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



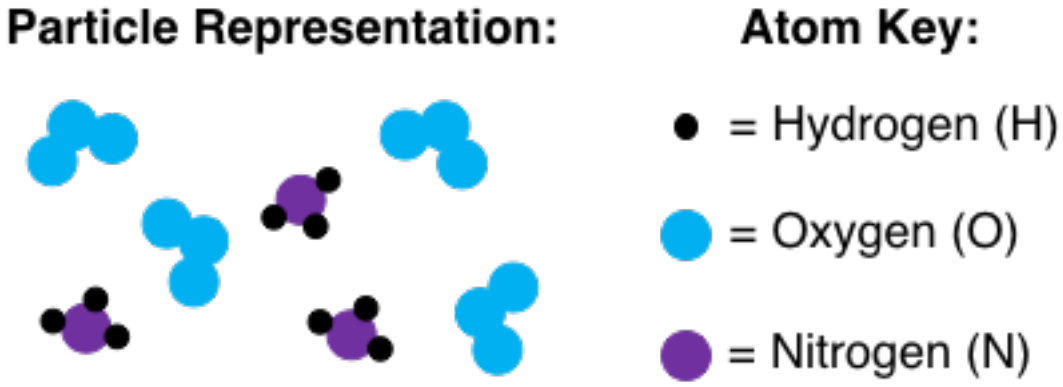
4 atoms of the element sodium and 3 molecules of the compound nitrogen dioxide (NO_2)
4 elements of the atom sodium and 3 compounds of the molecule nitrogen dioxide (NO_2)
4 atoms of the element sodium and 3 atoms of compound nitrogen and 6 atoms of compound oxygen
4 elements of sodium atoms and 3 molecules of the compound nitrogen dioxide (NO_2)

Question 18
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



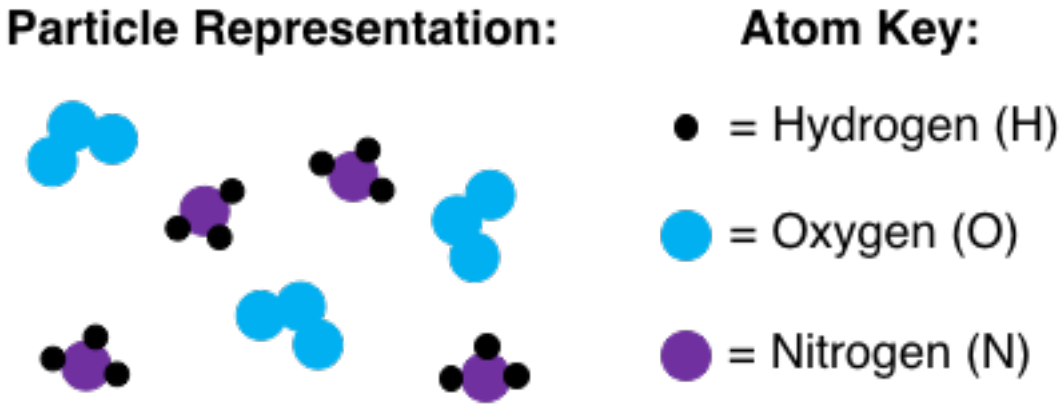
3 atoms of the element sodium and 4 molecules of the compound nitrogen dioxide (NO_2)
3 elements of the atom sodium and 4 compounds of the molecule nitrogen dioxide (NO_2)
3 atoms of the element sodium and 4 atoms of compound nitrogen and 8 atoms of compound oxygen
3 elements of sodium atoms and 4 molecules of the compound nitrogen dioxide (NO_2)

Question Group 10
Question 19
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



$4\ O_3\ +\ 3\ NH_3$
$3\ O_4\ +\ 3\ NH_3$
$3\ O_4\ +\ 3\ N\ +\ 3\ H_3$
$12\ O_3\ +\ 3\ N\ +\ 9\ H_3$

Question 20
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?



$3\ O_3\ +\ 4\ NH_3$
$9\ O_3\ +\ 4\ NH_3$
$3\ O_3\ +\ 4\ N\ +\ 4\ H_3$
$9\ O_3\ +\ 4\ N\ +\ 12\ H_3$

Question Group 11
Question 21
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Copper (Cu)

4 Cu + 3 H_2O
Cu_4 + 3 H_2O
4 Cu + 3 H_2 + 3 O
Cu_4 + 3 H_2 + 3 O

Question 22
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:

Atom Key:

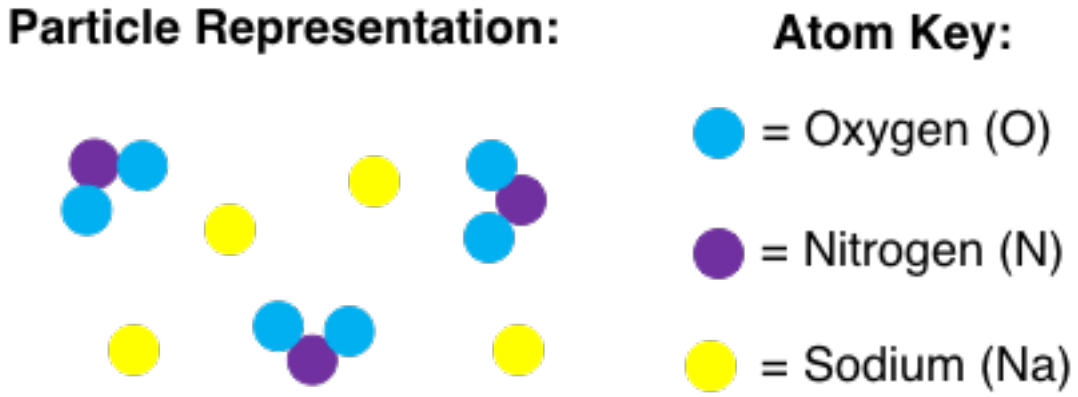
● = Hydrogen (H)

● = Oxygen (O)

● = Copper (Cu)

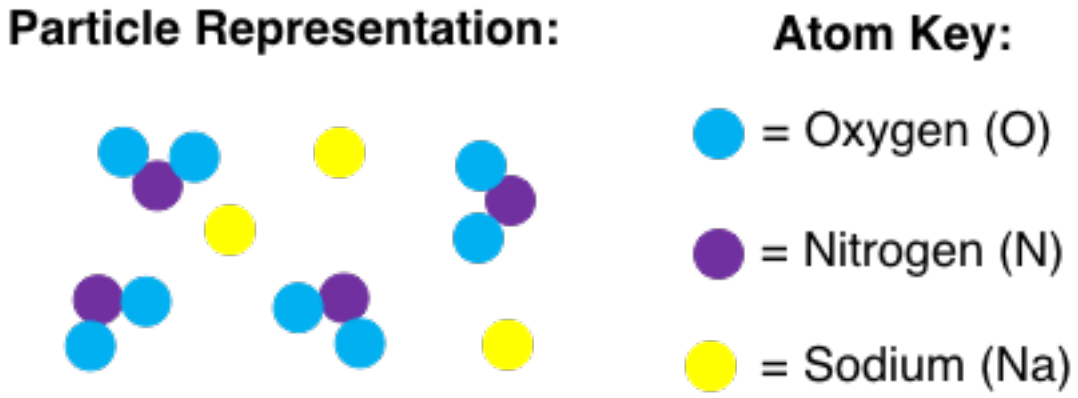
3 Cu + 4 H_2O
Cu_3 + 4 H_2O
3 Cu + 4 H_2 + 4 O
Cu_3 + 4 H_2 + 4 O

Question Group 12
Question 23
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?



$4\ Na\ +\ 3\ NO_2$
$Na_4\ +\ 3\ NO_2$
$4\ Na\ +\ 3\ O_2\ +\ 3\ N$
$Na_4\ +\ 3\ O_2\ +\ 3\ N$

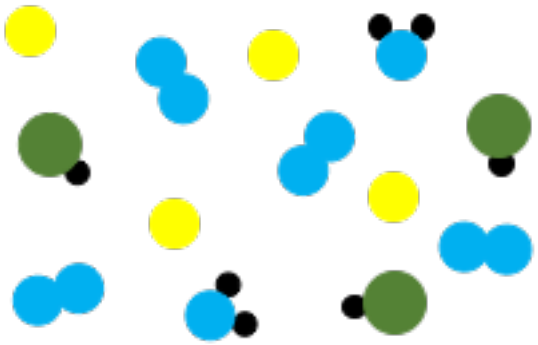
Question 24
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?



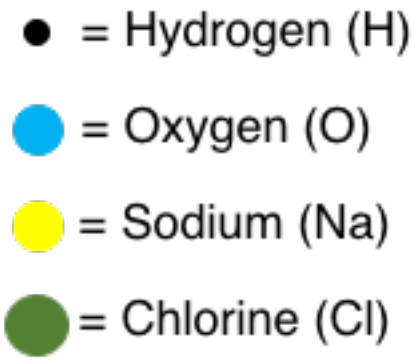
$3\ Na\ +\ 4\ NO_2$
$Na_3\ +\ 4\ NO_2$
$3\ Na\ +\ 4\ O_2\ +\ 4\ N$
$Na_3\ +4\ O_2\ +\ 4\ N$

Wizard Difficulty Level
Question Group 13
Question 25
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?

Particle Representation:



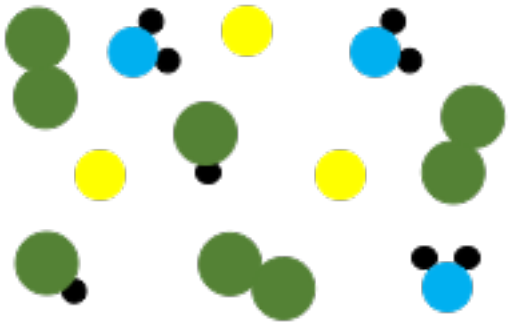
Atom Key:



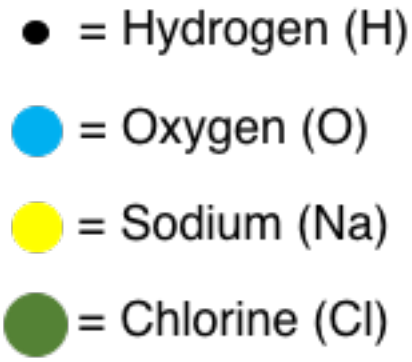
There are eight atoms of diatomic hydrogen molecules.
There are four atoms of the element sodium.
There are three molecules of the compound hydrogen chloride (HCl).
There are two molecules of the compound water (H_2O).

Question 26
Consider the Particle Representation and accompanying Atom Key. Which one statement does NOT correctly describe the diagram?

Particle Representation:



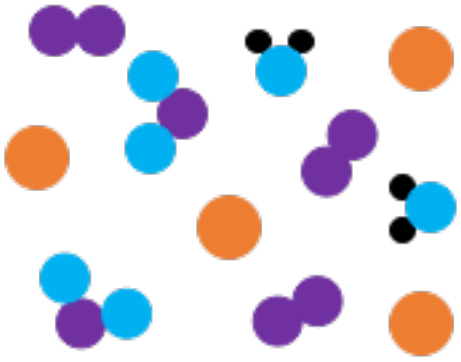
Atom Key:



There are three molecules of the compound sodium.
There are three molecules of diatomic chlorine.
There are two molecules of the compound hydrogen chloride (HCl).
There are three molecules of the compound water (H_2O).

Question Group 14
Question 27
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?

Particle Representation:



Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

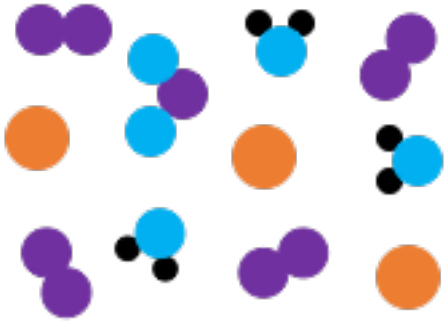
● = Nitrogen (N)

● = Copper (Cu)

There are four elements of the compound copper.
There are three diatomic molecules of the element nitrogen.
There are two molecules of the compound water (H_2O).
There are two molecules of the compound nitrogen dioxide (NO_2).

Question 28
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?

Particle Representation:



Atom Key:

● = Hydrogen (H)

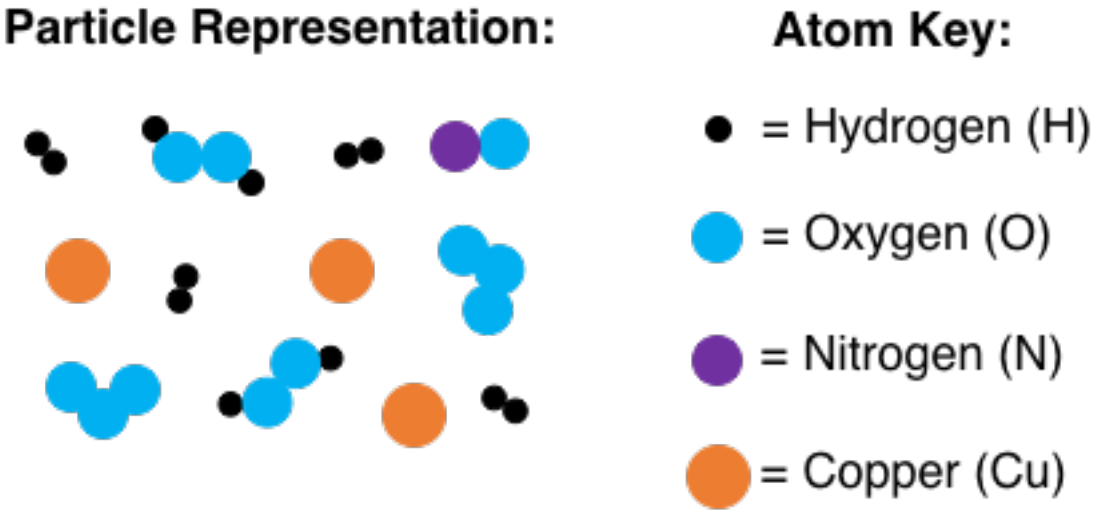
● = Oxygen (O)

● = Nitrogen (N)

● = Copper (Cu)

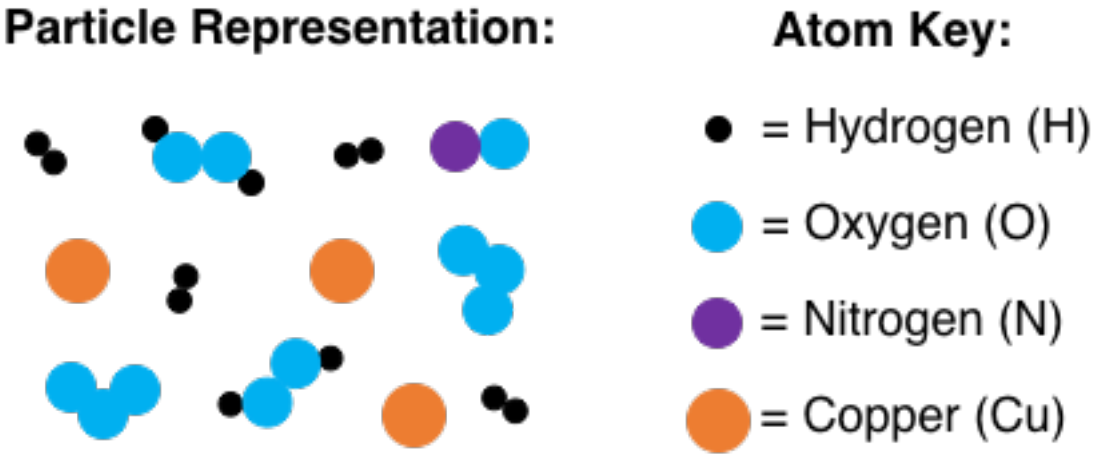
There are eight atoms of the molecule nitrogen.
There are three atoms of the element copper.
There are three molecules of the compound water (H_2O).
There is one molecule of the compound nitrogen dioxide (NO_2).

Question Group 15
Question 29
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



There are three elements of the compound copper.
There are four diatomic molecules of the element hydrogen.
There are two molecules of the compound hydrogen peroxide (H_2O_2).
There is one molecule of the compound nitrogen monoxide (NO).

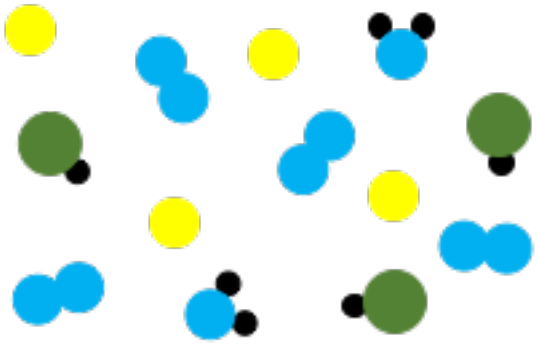
Question 30
Consider the Particle Representation and accompanying Atom Key. Which verbal description correctly describes the diagram?



There are six atoms of the element oxygen.
There are three atoms of the element copper.
There are three molecules of the compound nitrogen monoxide (NO).
There is one molecule of the compound hydrogen peroxide (H_2O_2).

Question Group 16
Question 31
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:



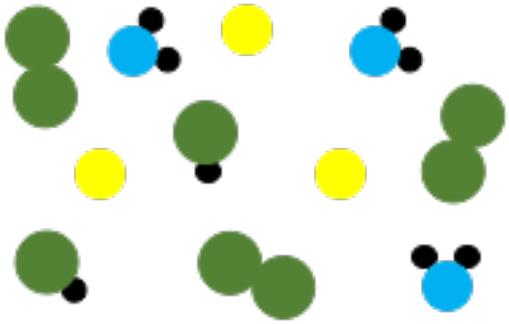
Atom Key:

● = Hydrogen (H)
● = Oxygen (O)
● = Sodium (Na)
● = Chlorine (Cl)

$4\ Na + 3\ HCl + 4\ O_2 + 2\ H_2O$
$4\ Na + 3\ HCl + 8\ O + 2\ H_2O$
$Na_4 + 3\ HCl + 4\ O_2 + 2\ H_2O$
$Na_4 + 3\ HCl + 8\ O + 2\ H_2O$

Question 32
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:



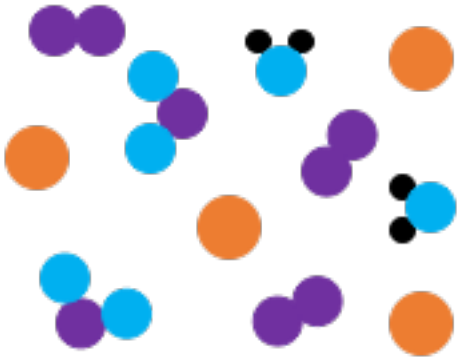
Atom Key:

● = Hydrogen (H)
● = Oxygen (O)
● = Sodium (Na)
● = Chlorine (Cl)

$3\ Na + 2\ HCl + 3\ Cl_2 + 3\ H_2O$
$3\ Na + 2\ HCl + 6\ Cl + 3\ H_2O$
$Na_3 + 2\ HCl + 3\ Cl_2 + 3\ H_2O$
$Na_3 + 2\ HCl + 6\ Cl + 3\ H_2O$

Question Group 17
Question 33
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:



Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

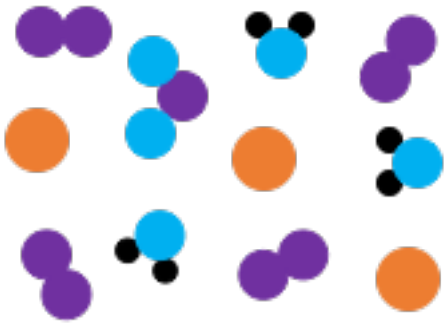
● = Nitrogen (N)

● = Copper (Cu)

4 Cu + 2 NO_2 + 2 H_2O + 3 N_2
4 Cu + 2 NO_2 + 2 H_2O + 6 N
4 Cu_4 + 2 NO_2 + 2 H_2O + 2 N_3
4 Cu_4 + N_2O_4 + H_4O_2 + 3 N_2

Question 34
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:



Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

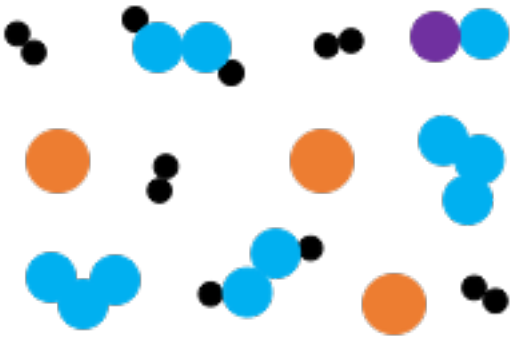
● = Nitrogen (N)

● = Copper (Cu)

3 Cu + NO_2 + 3 H_2O + 4 N_2
3 Cu + NO_2 + 3 H_2O + 2 N_4
Cu_3 + NO_2 + 3 H_2O + 8 N
3 Cu_3 + NO_2 + H_6O_3 + 4 N_2

Question Group 18
Question 35
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:



Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

● = Copper (Cu)

3 Cu + NO + 2 H_2O_2 + 4 H_2 + 2 O_3
3 Cu + NO + 2 H_2O_2 + 2 H_4 + 3 O_2
3 Cu_3 + NO + 2 H_2O_2 + 4 H_2 + 2 O_3
3 Cu + NO + H_4O_4 + 4 H_2 + 2 O_3

Question 36
Consider the Particle Representation and accompanying Atom Key. Which set of formulas correctly describes the diagram?

Particle Representation:

Atom Key:

● = Hydrogen (H)

● = Oxygen (O)

● = Nitrogen (N)

● = Copper (Cu)

3 Cu + 3 NO + H_2O_2 + 3 H_2 + 2 O_3
3 Cu + 3 NO + H_2O_2 + 2 H_3 + 3 O_2
3 Cu_3 + N_3O_3 + H_2O_2 + 3 H_2 + 2 O_3
Cu_3 + N_3O_3 + H_2O_2 + 3 H_2 + 2 O_3