During Class Invention

Chemical Equations

Name(s) with Lab section in Group

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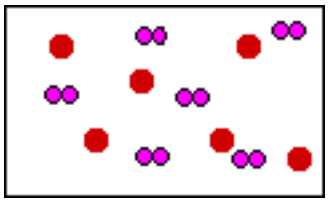
1. The equation for the reaction is

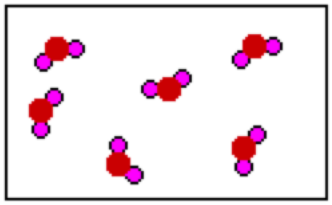
$$2S(g) + 3O_2(g) \text{ ---> } 2SO_3(g)$$

Consider a mixture of sulfur atoms and dioxygen molecules in a closed container below:

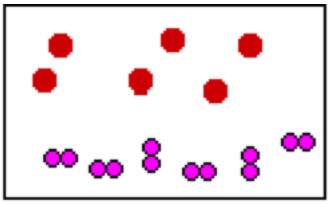


For each of the following explain why the representation is correct or incorrect.

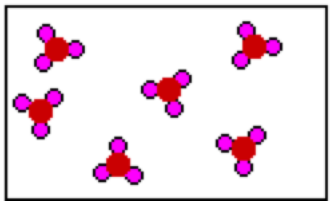
a/



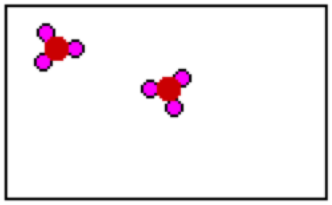
b/



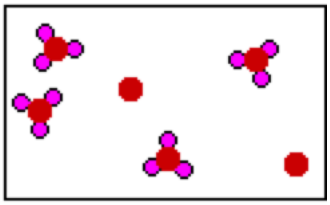
c/



d/



e/



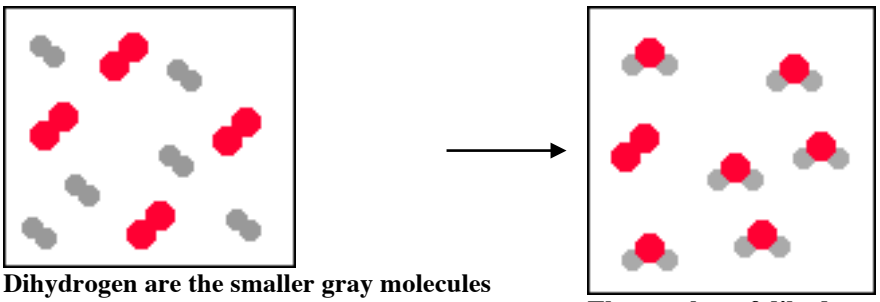
The most correct choice is 'e'. According to the balanced chemical equation 3 molecules of dioxygen react with every 2 atoms of sulfur. Six sulfur atoms require 9 dioxygen molecules. However there are only 6 dioxygen molecules. So there is not enough dioxygen molecules to completely react with all the sulfur atoms. However 6 dioxygen molecules only require 4 sulfur atoms to completely react, forming 4 sulfur trioxide molecules. So if four atoms of sulfur react, two sulfur atoms remain unreacted.
In choice 'a' the product is SO_2 , this can not be the correct response since the product in the chemical equation is SO_3.

2. The reaction between hydrogen and oxygen to form water is shown below

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$$

a) In the container below draw a mixture of the reactants before any reaction has occurred.

b) In the container below draw the mixture after the reaction has occurred as described by the equation above.

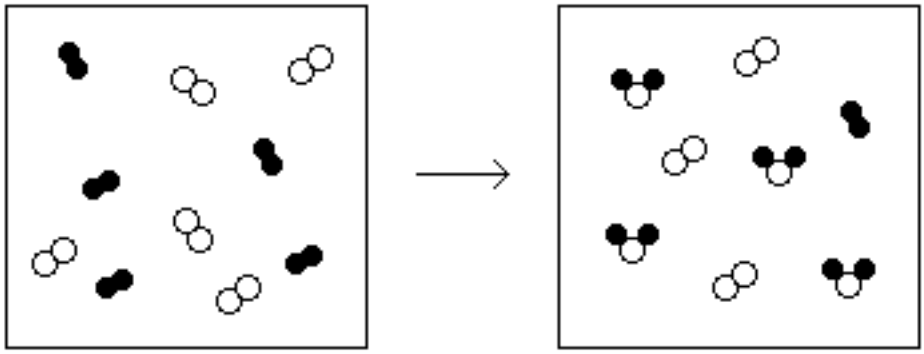


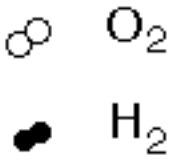
Dihydrogen are the smaller gray molecules and dioxygen are the larger red molecules.

Important note: The number of dihydrogen and dioxygen molecules in the drawing is not critical. because the balanced chemical equation says that dihydrogen REACTS with dioxygen in a two to on does not mean the drawing must show a two to one of the reactants….any ratio initial is OK.

The number of dihydrogen and dioxygen molecules is critical in this drawing. The balanced chemical equation says the reactants combine in a two (dihyrogen) to one (dioxygen) ratio. So four dioxygen would require eight dihydrogen molecules. But there only zix dihydrogen molecules, So that would mean we only need three dioxygen molecules to completely react with all of the dihydrogen molecules. When three dioxygen molecules react six water molecules are formed according to the balanced chemical equation.

c) In the left most container below is a mixture of H_2 and O_2 molecules. In the container on the right, below draw what the contents of the container would be after the reaction takes place.



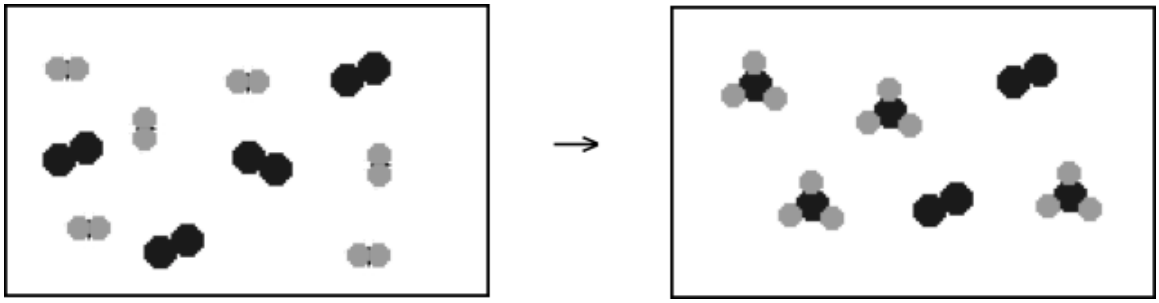


A few comments about the product container. You might wonder why the last hydrogen molecule did not react? IN this particular case the balanced chemical equation indicates that hydrogen reacts with oxygen in a two (H_2) to one (O_2) ratio. Since we only have one H_2 remaining in the container it could react with an O_2, but it would leave an unreacted O atom. There are no O atoms in the balanced chemical equation so we would think the last H_2 molecule would not react.

3. In the container below labeled Products are the contents after the reaction described by the chemical equation, (6)

$$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$$

has occurred. In the Reactants container, draw and label the contents before the reaction occurs.



Reactants Products