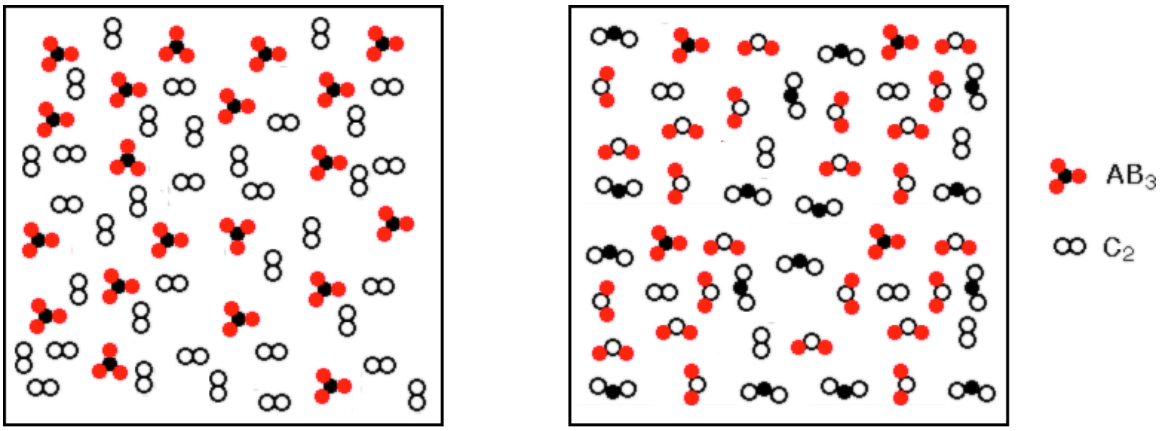
1. Consider the container label 'initial condition' as the reactants before any reaction has occurred, and the container labeled 'final condition' as the same container after the reaction has reached completion. Write a balanced chemical equation that best describes the reaction represented by the containers below?



Looking at the Initial Condition container the two reactants are AB_3 and C_2. Looking at Final Condition container the products are AC_2 and CB_2. So the chemical equation is;

$$\mathbf{AB_3 + C_2 \rightarrow\ AC_2 + CB_2}$$

The balanced equation would be,

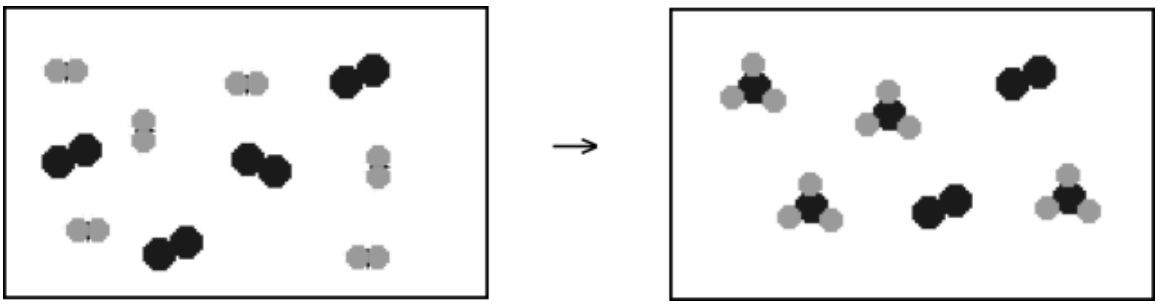
$$\mathbf{4AB_3 + 7C_2 \rightarrow\ 4AC_2 + 6CB_2}$$

To balance the equation equalize the B atoms with a coefficient of 3 for CB_2 and a coefficient of 2 for AB_3. Then balance AC_2 with a coefficient of 2. Adding up the C atoms on the product side there are 7, so to balance the C atoms on the reactants $\frac{7}{2}$ C_2 is needed, then double all the coefficents.

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

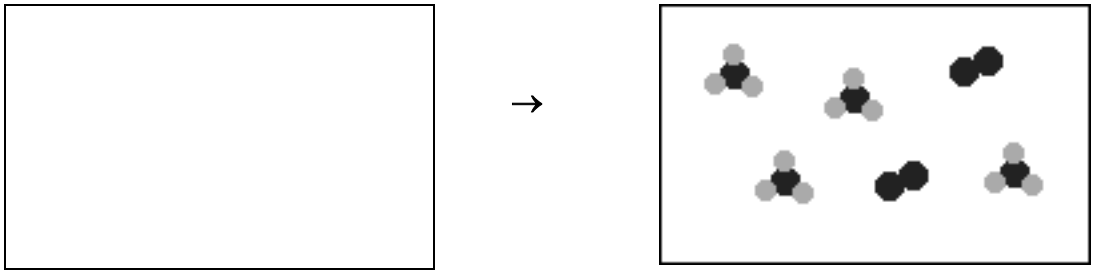
$$N_2(g) + 3H_2(g) \rightarrow\ 2NH_3(g)$$

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



Reactants Products

Looking at the original



Reactants **Products**

The ICE table would look like,

	$N_2(g)$	+ $3H_2(g)$	→ $2NH_3(g)$
Initial			
Change			
End	**2**	**0**	**4**

Assume there are no products initially, then 4 molecules of NH_3 must be formed.

	$N_2(g)$	+ $3H_2(g)$	→ $2NH_3(g)$
Initial			**0**
Change			**4**
End	**2**	**0**	**4**

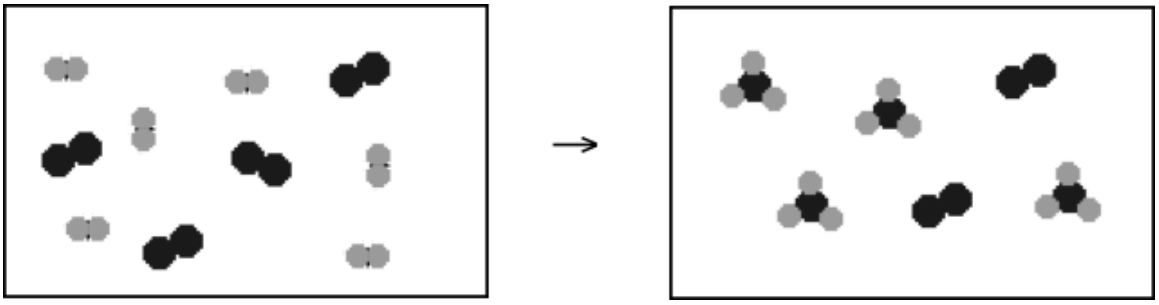
So now thee Change row can be completed,

	$N_2(g)$	+ $3H_2(g)$	→ $2NH_3(g)$
Initial			**0**
Change	**-2**	**-6**	**4**
End	**2**	**0**	**4**

So the initial amounts must be,

	$N_2(g)$	+ $3H_2(g)$ →	$2NH_3(g)$
Initial	**4**	**6**	**0**
Change	**-2**	**-6**	**4**
End	**2**	**0**	**4**

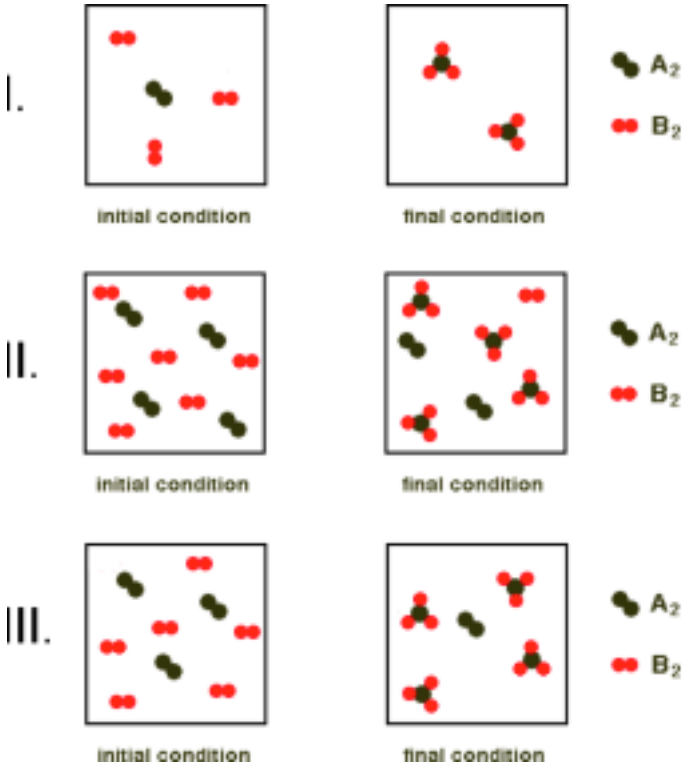
So the diagram would look like,



Reactants **Products**

3. Which of the following changes can be described by the balanced chemical equation,

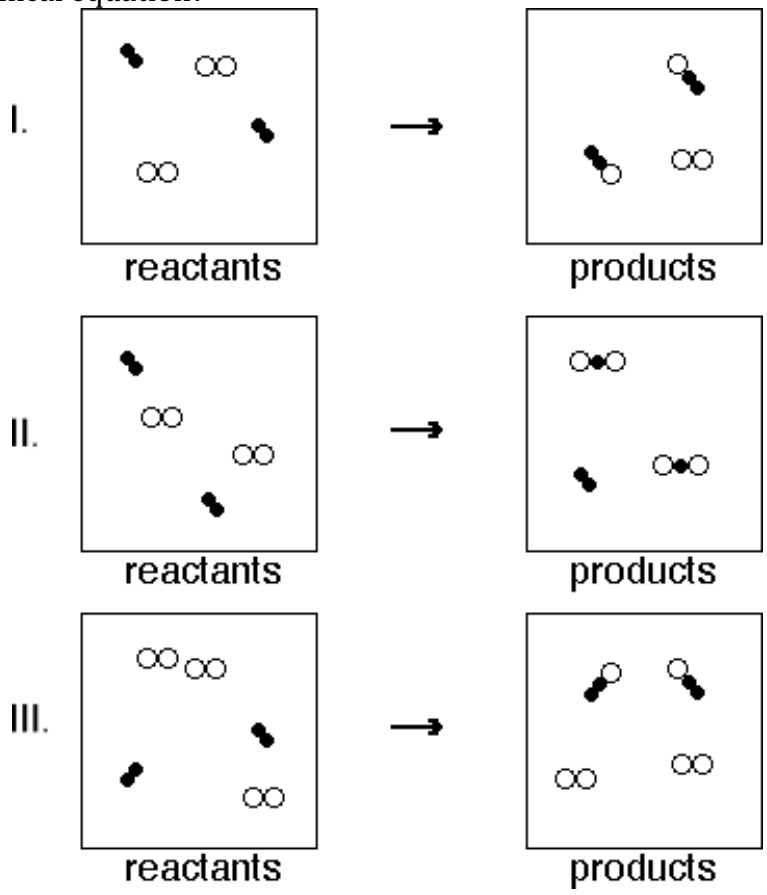
$$A_2(g) + 3B_2(g) \rightarrow 2AB_3(g)$$



A) I only
B) II only
C) I and III
D) II and III
E) I, II and III

The Change row for each of the three sets of diagrams have the same ratio as the coefficients in the balanced chemical equation.

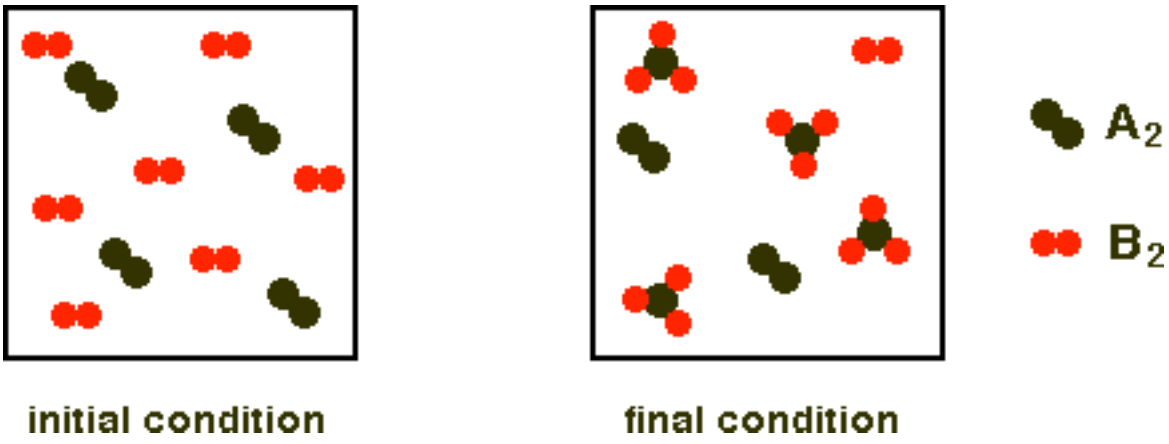
4. Which of the following representations can be described using the same balanced chemical equation?



A) I and II
B) I and III
C) II and III
D) I, II and III
E) I, II and III are each different

Can eliminate II since the product is different from the products of I and III. In the case of I and III the ratio of the Change row is the same, so they must have the same balanced chemical equation.

5. Which of the chemical equations best describes the reaction represented by the containers below? Consider the container label 'initial condition' as the reactants before any reaction has occurred, and the container labeled 'final condition' as the same container after the reaction has reached completion.



A) $4A_2(g) + 7B_2(g) \rightarrow 4AB_3(g)$

B) $4A_2(g) + 7B_2(g) \rightarrow 4AB_3(g) + 1B_2(g) + 2A_2(g)$

C) $A_2(g) + 3B_2(g) \rightarrow 2AB_3(g)$

D) $4A_2(g) + 6B_2(g) \rightarrow 4AB_3(g)$

E) $A_2(g) + B_2(g) \rightarrow AB_3(g)$

So the initial condition must be,

	$A_2(g)$	+ $B_2(g)$ →	$AB_3(g)$
Initial	**4**	**7**	**0**

And the final condition must

	$A_2(g)$	+ $B_2(g)$ →	$AB_3(g)$
Initial	**4**	**7**	**0**
Change			
End	**2**	**1**	**4**

So the Change row is,

	$A_2(g)$	+ $B_2(g)$ →	$AB_3(g)$
Initial	**4**	**7**	**0**
Change	**-2**	**-6**	**4**
End	**2**	**1**	**4**

And the balanced chemical equation is,

$$\mathbf{A_2}\boldsymbol{(g)} + \mathbf{3B_2}\boldsymbol{(g)} \rightarrow \mathbf{2AB_3}\boldsymbol{(g)}$$