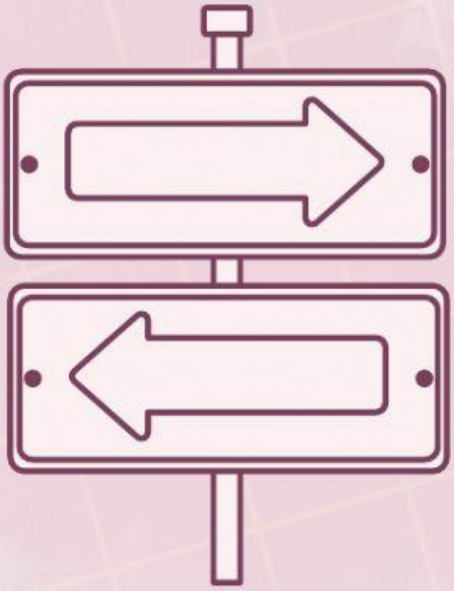
KHARISMA BANGSA
SCHOOL OF GLOBAL EDUCATION

LKPD

with Problem Based Learning

Changing Conditions in Equilibrium



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PPG Dalam Jabatan Kategori 2

KHARISMA BANGSA
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LKPD

with Problem Based Learning

Changing Conditions in Equilibrium

Group:
Group members:
1.
2.
3.
4.
5.

Petunjuk Penggunaan LKPD:

1. Setiap kelompok harus membaca LKPD dengan seksama
2. Baca dan pahamilah tujuan pembelajaran yang akan dicapai
3. Baca dan pahamilah informasi pendukung sebelum mengerjakan kegiatan
4. Perhatikan secara seksama masalah yang ada, kemudian coba ikuti petunjuk dan langkah penyelesaian masalah tersebut
5. Diskusikan setiap permasalahan yang ada dalam LKPD dengan sesama anggota kelompok.
6. Mintalah bantuan guru jika ada yang tidak mengerti

TUJUAN PEMBELAJARAN

1. Peserta didik dapat memahami factor-faktor yang mempengaruhi kesetimbangan.
2. Peserta didik mampu menerapkan konsep factor-faktor yang mempengaruhi kesetimbangan dalam kehidupan sehari-hari.
3. Peserta didik mampu merancang bagan konsep penerapan factor-faktor yang mempengaruhi kesetimbangan kimia dalam kehidupan sehari-hari.

KOMPETENSI DASAR

3.9 Menganalisis faktor-faktor yang mempengaruhi pergeseran arah kesetimbangan dan penerapannya dalam industri.
4.9 Merancang, melakukan, dan menyimpulkan serta menyajikan hasil percobaan faktor-faktor yang mempengaruhi pergeseran arah kesetimbangan.

INDIKATOR PENCAPAIAN KOMPETENSI

3.9.1 Memahami faktor-faktor yang mempengaruhi kesetimbangan
3.9.2 Menerapkan konsep faktor-faktor yang mempengaruhi kesetimbangan dalam kehidupan sehari-hari
4.9.1 Merancang bagan penerapan konsep factor-faktor yang mempengaruhi kesetimbangan kimia dalam kehidupan sehari-hari

FASE 1: ORIENTASI PESERTA DIDIK PADA MASALAH

Ice cubes can melt and form water. This is an endothermic reaction because the heat is being absorbed by the ice cubes to react. Reversely, when we put back the water into freezer, it freezes.

- Have you ever thought what would happen when there are more ice cubes which melt or more water freezes?
- What if suddenly the blackout happens and the temperature of the refrigerator goes down?

Analysis:

FASE 2: MENGORGANISASI PESERTA DIDIK UNTUK BELAJAR

Try to do a research about conditions which can affect the reversible reactions. Please write down the books and the sites that you used for your research.

Analysis:

FASE 3: MEMBIMBING PENYELIDIKAN INDIVIDU ATAU KELOMPOK

SECTION 1

Have you ever went to a cave?
If you have, you must have seen the stones hang down from the ceilings (*stalactite*), or rise from the ground (*stalagmite*).
Stalactites and stalagmites decorate caves the world over. They grow incredibly slowly.

The chemical formulae of stalactite and stalagmite is calcium carbonate ($CaCO_3$). Their growth is linked to their external environment. The carbon dioxide gas in the atmosphere reacts with the dripping water in the cave air. This mixture will be able to dissolve calcium carbonate. The equilibrium equation as follows.

$$CaCO_{3(s)} + CO_{2(aq)} + H_2O_{(l)} \rightleftarrows Ca^{2+}{}_{(aq)} + 2HCO_3^-{}_{(aq)}$$

If the amount of carbon dioxide in the atmosphere has increased,

- Will the amount of calcium carbonate that reacts with acid increases or decreases?
- Predict whether the amount of calcium ion will increase or decrease.
- Which other substances would be increased in equilibrium?
- To which direction the equilibrium will shift to? To the reactants or products?

If the amount of carbon dioxide in the environment has decreased,

- Will the reaction produce more or less calcium ion?
- To which direction the equilibrium will shift to? To the reactants or products?

By that, we can conclude that:

- When the amount/concentration of reactants _____, the equilibrium will shift to the _____. It means the yield of the products will increase.
- When the amount/concentration of reactants _____, the equilibrium will shift to the _____. It means the yield of the products will decrease.

SECTION 2

Have you ever boil water or soup? Or maybe have you seen your mother boil water or soup? When we boil water or soup, usually we close the pan using its lid. When the lid was on the pan, we could see some water vapour trap on the inner side of the lid. But when we open the lid, the water vapour turns back into water.

This phenomena applies the concept of reversible reaction, shown by the following equation.

$$H_2O_{(l)} \rightleftharpoons H_2O_{(g)}$$

- When the liquid turns into gaseous, what kind of reaction happens? Exothermic or endothermic? Explain your reason.

- What about the reverse reaction, is it exothermic or endothermic?

- When the lid was opened, what makes the water vapour turns back into liquid?

- Complete the following sentence based on your answer to the previous questions.

  When the temperature of the system has increased, the equilibrium shifts to the left/right* or towards exothermic/endothermic* reaction.
  When the temperature of the system has decreased, the equilibrium shifts to the left/right* or towards exothermic/endothermic* reaction.

  *you may strive the unnecessary one.

SECTION 3

Farmers need fertilisers for their plants to grow well. Did you know that the major component of fertiliser is ammonia? It is exist in fertilisers as compounds ammonium sulfate or ammonium phosphate. Have you ever thought about how does ammonia being produced? The production of ammonia itself uses the concept of reversible reaction as follows.

$$N_2\,(g) + 3H_2\,(g) \rightleftharpoons 2NH_3\,(g)$$

That process is called as Contact Process. In that process, the gases are compressed to about 200 atmospheres inside the compressor. When the pressure of the machine has increased, the amount of ammonia produced increased as well.

- Which of the products or reactants have the greater number of molecule?

- What happens to the equilibrium when the reaction occurs at 150 atmospheres? Will the amount of ammonia produced be greater or not? Explain your reason.

- When the pressure of the system has increased, will the equilibrium shift to the direction with greater or lower molecules?

- When the pressure of the system has increased, will the equilibrium shift to the direction with greater or lower molecules?

FASE 4: MENGEMBANGKAN DAN MENYAJIKAN KARYA

Please present your *role playing* accordingly to the scenario that you got, then explain the concept in front of class. You may write the questions or suggestions from your friends on the following space.

FASE 5: MENGANALISIS DAN MENGEVALUASI PROSES PEMECAHAN MASALAH

Please evaluate whether the result of your discussion matches with the concept or not. If you still find some misconception or incorrect answer, please write it on the following space. But if everything is correct already, you may skip this section.