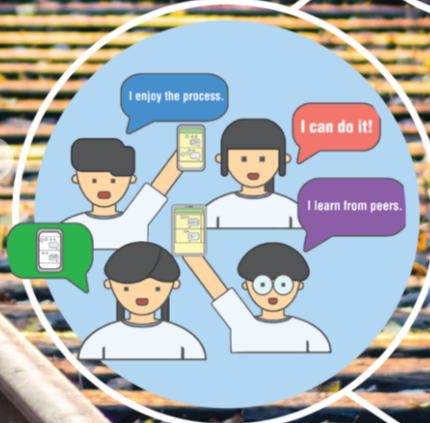


Promoting the Use of Educational Technology in Learning and Teaching in Science (S1-3) Learning and Teaching Resources

Thermal expansion and contraction



Student Worksheet
Integrated Science (S1)
Thermal expansion and contraction

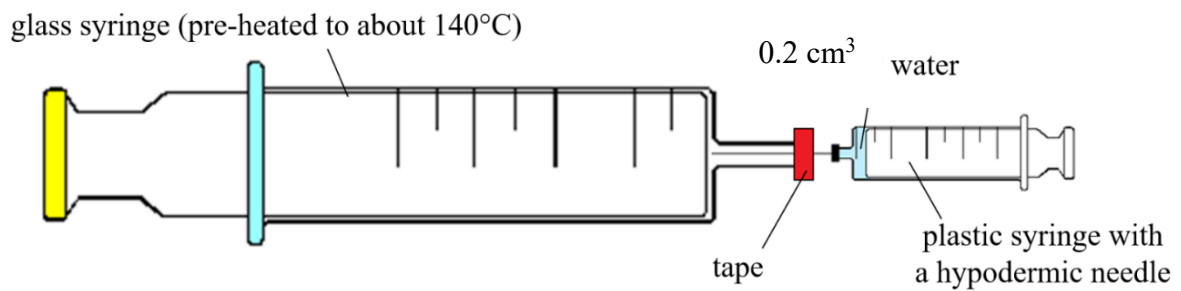
Name :		Class :	()	Date :	
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Task 1(a):

1. Complete the following table:

Scenario:

The plunger of a capped syringe is pushed all the way in. The glass syringe is then heated to 140°C. A drop of water was (0.2 cm³) is injected into the hot glass syringe.



“What would happen when the 0.2 cm³ water is injected into the 140°C hot glass syringe?”

<i>Predictions of what will be observed</i>	<i>Reasons for the predictions</i>

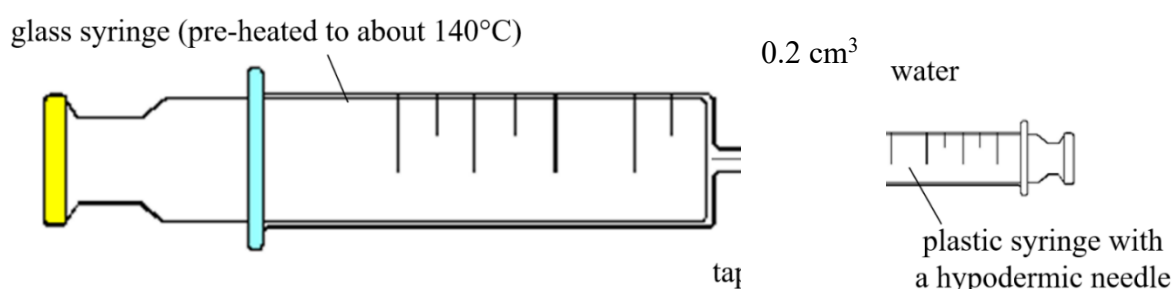
Task 1(b):

1. Share your predictions and proposed explanations with your classmates. Come to a *consensus* on your group’s predictions and explanations.

(Make sure that your group’s explanations include the following information: (1) the substance(s) inside the syringe and (2) how particles are arranged in the substance(s)).

Scenario:

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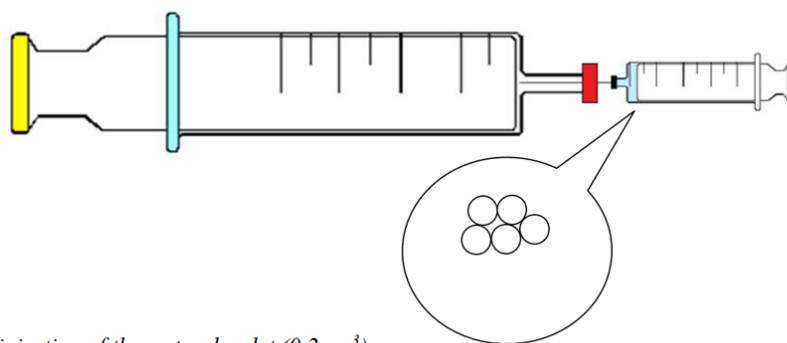
Task 2(a):

1. Watch the demonstration carefully.
2. Record your observations and inference in the demonstration:

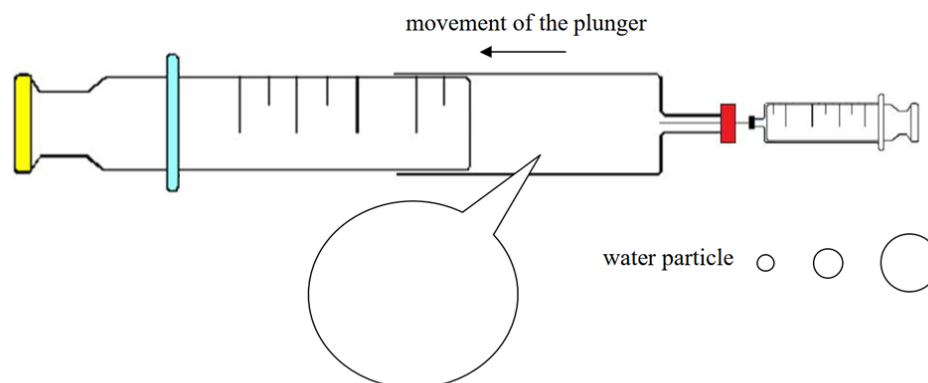
Volume inside the hot syringe	Movement of the plunger	Substance in the syringe

3. Construct a diagram to show the particle arrangement of the substance inside the syringe after injection of the water droplet on the *Drag Game* platform.

Before the injection of the water droplet (0.2 cm^3)



After the injection of the water droplet (0.2 cm^3)



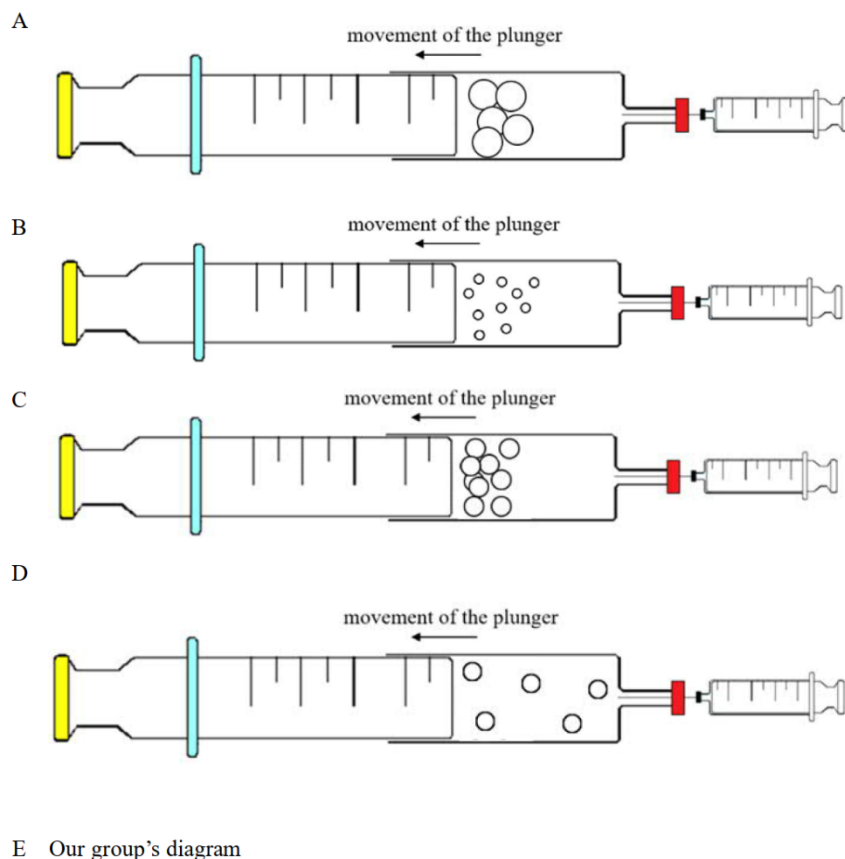
<https://draggame.e-learning.hk/en/templates/291/view/>

Task 2(b):

1. Share your *Drag Game* diagram with your peers.
2. For the following diagrams, which one does your group think best represents what happens at the particle level for explaining the observations in the demonstration.

Consider the following questions:

- Should the number of water particles change? Why?
- Should the size of the water particles change? Why?
- What should the distribution of the water particles be? Why?



Water particle ○ ○ ○

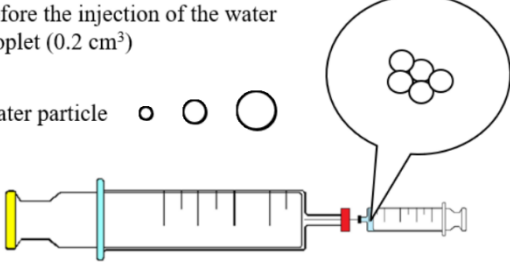
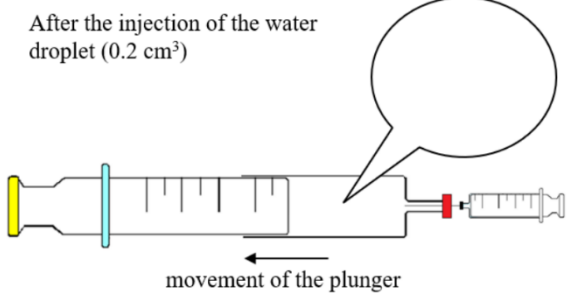
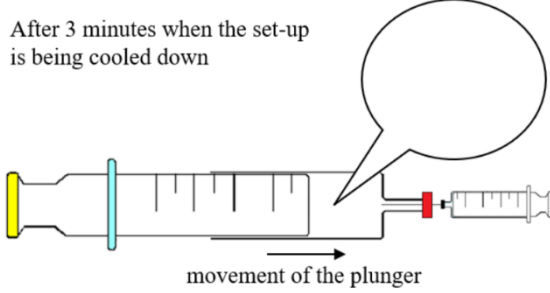
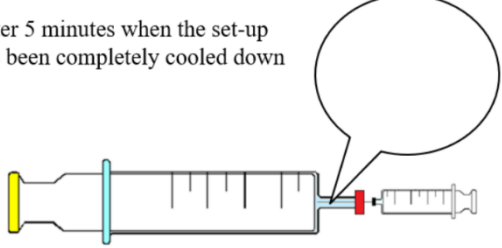
(a) We think that diagram _____ best represents what happens at the particle level because

(b) Why did the volume inside the syringe change?

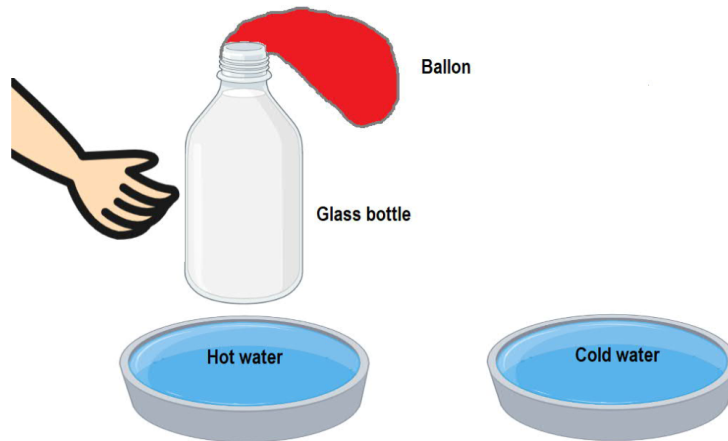
Task 3:

- Complete the following table and use the *Drag Game* diagram to answer the following question:

“What would happen to the substance inside the syringe at the particle level when the hot glass syringe is being/has been cooled down? Why?”

<p>Before the injection of the water droplet (0.2 cm³)</p> <p>Water particle ○ ○ ○</p> 	<p>After the injection of the water droplet (0.2 cm³)</p> 	
<p>After 3 minutes when the set-up is being cooled down</p> 	<p>After 5 minutes when the set-up has been completely cooled down</p> 	
<p><i>What you will observe</i></p>	<p><i>What will happen at the particle level</i></p>	<p><i>Why things will happen</i></p>

1. An empty glass bottle is fitted with a deflated balloon on its mouth. Using particle level diagrams, describe and explain what would happen to the balloon and why things would happen when it is placed in hot water and then in cold water.



“What would happen when the bottle is put into hot water and into cold water?”

What would happen at the particle level (Note: Draw the balloon only):

<i>Before putting into hot water (at room temperature)</i>	<i>In hot water</i>	<i>In cold water</i>

*Explanation of what would happen to the balloon and why things happen:
(You may find the following word bank useful in developing your explanation)*

<i>Word bank</i>			
Expand	Deflate	Contract	Air particles
Inflate	Temperature	Faster	Slower