



賽馬會「知優致優」計劃

Jockey Club “Giftedness Into Flourishing Talents” Project

# Water Purification

## Integrated Science Secondary 1

Level 1: School-based Whole-class Teaching



香港賽馬會慈善信託基金

The Hong Kong Jockey Club Charities Trust

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## **Background and Notes**

The design of the learning and teaching plan reflects the actual circumstances of the particular school at the time of implementation. As it is developed and tailor-made to meet the specific cognitive and affective needs of students, all learning and teaching resources are for reference only.

When adapting the materials, curriculum, instructional and assessment modifications can be made in accordance with the diverse needs and abilities, learning styles and aspirations of students, professional competence of teachers, and gifted education development of the schools.

Teachers are strongly recommended to read the introduction, theoretical background and summary of the resource package to have a better understanding of the principles of Gifted Education and strategies for implementation.

**This unit includes 1 lesson plan and 3 worksheets.**

With reference to our resources, educators can design suitable learning activities and implement the elements of Gifted Education, based on students' needs and interests, and teaching experience, so as to unfold students' potentials to the fullest.




All educators can view, download and use the resources for educational and non-commercial purposes. The Jockey Club "Giftedness Into Flourishing Talents" Project of the Chinese University of Hong Kong is the copyright owner. When using the resources, acknowledgement should be made in full name, i.e. Jockey Club "Giftedness Into Flourishing Talents" Project of the Chinese University of Hong Kong.

## Topic — Water Purification

Subject: Science

Grade: Secondary I

No. of Lessons (Learning Time): 2 Separated Lessons (110 minutes)





<b>Prior Knowledge</b>	Skills in using chemical apparatus, including measuring cylinder, dropper, conical flask etc.		
<b>Learning Objectives</b>	<ul style="list-style-type: none"><li>- Students should be able to recognize the methods of removing dye, heavy metal ions in polluted water</li><li>- Students should be able to write experimental procedures of experiments in purifying polluted water</li><li>- Students should be able to master science process skills, including observing, predicting, measuring, recording and inferring</li><li>- Students should be able to show curiosity and sustain interest in learning science</li></ul>		
<b>Learning &amp; Teaching Strategies</b>	Questioning, Group Experiment, Group Discussion, Presentation		
<b>Operation Mode of Gifted Education</b>	Level 1: School-based Whole-class Teaching		
<b>Core Elements of Gifted Education</b>	 Higher-order Thinking Skills	 Creativity	 Personal-social Competence

## Lesson 1

### Pre-lesson Tasks

1. Students have self-study on some basic concepts of activated charcoal, pH and neutralisation, heavy metal ions, sodium hydroxide, precipitate, physical and chemical changes, and complete the Pre-learning Task Worksheet.
2. Students clarify the concepts in an online discussion group with the teacher and classmates before the lesson.

### Procedure








Learning Focus (Time)	Activity / Content	Learning & Teaching Strategies	Elements of Gifted Education	Learning & Teaching Resources
Basic knowledge and skills in conducting experiments in removing of impurities in water (40 minutes)	Students review the concepts learnt in pre-lesson task with the teacher.	Questioning	 	Lesson Worksheet 1
	Students conduct the following two experiments: - <i>Expt. A - Removal of dye</i> - <i>Expt. B - Removal of heavy metal ions</i>	Group Experiment		Materials provided
Discussion and sharing of observations and findings (15 minutes)	Students discuss the results with their groupmates.	Group Discussion	 	Lesson Worksheet 1
	Students present their observations and findings in front of the whole class.	Presentation		

## Lesson 2

### Pre-lesson Task

Students design their experiment and write the procedures individually on Lesson Worksheet 2.

### Procedure

Learning Focus (Time)	Activity / Content	Learning & Teaching Strategies	Elements of Gifted Education	Learning & Teaching Resources
Find the most suitable procedures of conducting the experiment (5 minutes)	Students discuss the pros and cons of the procedures of their designed experiments in groups.	Group Discussion	  	Lesson Worksheet 2
	Students conclude and decide on the most suitable procedures for controlling the pH of the water sample.			
Conducting designed experiment (35 minutes)	Students conduct the self-designed experiment.	Group Experiment	 	Lesson Worksheet 2 Materials provided
Discussion and sharing of observations and findings (15 minutes)	Students discuss the results with their groupmates.	Group Discussion	 	Lesson Worksheet 2
	Students give a presentation on their observations and findings in front of the whole class.	Presentation		