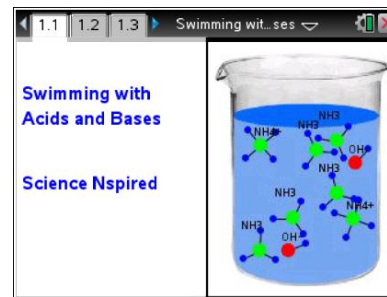


**Open the TI-Nspire document**

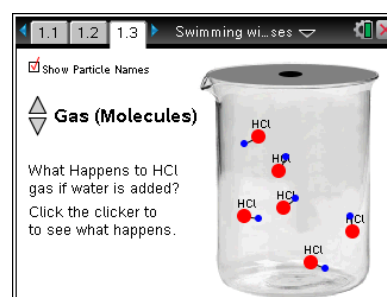
***Swimming\_with\_Acids\_and\_Bases.tns.***

What happens when acids and bases are added to water? In this activity you will be able to answer this question by zooming in on molecules of acids and bases. This view will bring you closer to the molecular level, as if you were swimming with these molecules.



**Move to pages 1.2 and 1.3.**

1. Read the instructions on page 1.2 for controlling the simulation on page 1.3. The up and down arrows in the top left controls the addition (and removal) of water. The check-box at the top will show the particle names if the box is checked and will hide the names if the box is unchecked.



**Move to page 1.4. Answer question 1 here and/or in the .tns file.**

- Q1. When added to water, gaseous HCl \_\_\_\_\_.
- |   |  |
|---|--|
| A. partially dissociates into H and Cl atoms  | C. partially ionizes into H <sup>+</sup> and Cl <sup>-</sup> ions  |
| B. completely dissociates into H and Cl atoms | D. completely ionizes into H <sup>+</sup> and Cl <sup>-</sup> ions |

**Move to pages 2.1 and 2.2.**

2. Run the second simulation with gaseous HF.

**Move to page 2.3. Answer question 2 here and/or in the .tns file.**

- Q2. When added to water, gaseous HF \_\_\_\_\_.
- |  |   |
|--|---|
| A. partially dissociates into H and F atoms  | C. partially ionizes into H <sup>+</sup> and F <sup>-</sup> ions  |
| B. completely dissociates into H and F atoms | D. completely ionizes into H <sup>+</sup> and F <sup>-</sup> ions |

**Move to pages 3.1 and 3.2.**

3. Run the third simulation with solid NaOH.



Move to page 3.3. Answer question 3 here and/or in the .tns file.

- Q3. When added to water, solid NaOH \_\_\_\_\_.
- A. partially dissociates into Na atoms and OH molecules      C. partially ionizes into  $\text{Na}^+$  and  $\text{OH}^-$  ions
- B. completely dissociates into Na atoms and OH molecules      D. completely ionizes into  $\text{Na}^+$  and  $\text{OH}^-$  ions

Move to pages 4.1 and 4.2.

4. Do the fourth simulation with gaseous  $\text{NH}_3$ .

Move to page 4.3. Answer question 4 here or in the .tns file.

- Q4. When added to water, gaseous  $\text{NH}_3$  \_\_\_\_\_.
- A. partially dissociates into N and H atoms      C. partially ionizes into  $\text{NH}_4^+$  and  $\text{OH}^-$  ions
- B. completely dissociates into N and H atoms      D. completely ionizes into  $\text{NH}_4^+$  and  $\text{OH}^-$  ions

Move to pages 5.1 – 5.4. Answer questions 5 - 8 here or in the .tns file.

- Q5. HCl and HF are acids because they \_\_\_\_\_ in water.
- A. produce  $\text{H}^+$  ions      C. partially ionize
- B. produce  $\text{OH}^-$  ions      D. completely ionize
- Q6. NaOH and  $\text{NH}_3$  are bases because they \_\_\_\_\_ in water.
- A. produce  $\text{H}^+$  ions      C. partially ionize
- B. produce  $\text{OH}^-$  ions      D. completely ionize
- Q7. HCl and NaOH are “strong” because they \_\_\_\_\_ in water.
- A. produce positive ions      C. partially ionize
- B. produce negative ions      D. completely ionize
- Q8. HF and  $\text{NH}_3$  are “weak” because they \_\_\_\_\_ in water.
- A. produce positive ions      C. partially ionize
- B. produce negative ions      D. completely ionize