



Name: \_\_\_\_\_ #: \_\_\_\_\_

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**Chapter 4 Section 2 Study Guide: How Minerals Form**

<p><b>Processes That Form Minerals</b> Two ways minerals can form are...</p>	<ol style="list-style-type: none"> <li>1. <u>Crystallization of melted materials</u></li> <li>2. <u>Crystallization of materials dissolved in water</u></li> </ol>
<p><b>Minerals From Magma</b> Where does hot magma finally cool?  How do crystals form?  Large Crystals  Small Crystals</p>	<ol style="list-style-type: none"> <li>1. <u>Inside Earth's crust</u></li> <li>2. <u>Hardens on the surface</u></li> </ol> <ul style="list-style-type: none"> <li>• When liquid cools into a solid state, crystals form</li> <li>• The size of the crystals depends on several factors <ul style="list-style-type: none"> <li>○ The rate at which magma cools</li> <li>○ The amount of gas that the magma contains</li> <li>○ The chemical composition of the magma</li> </ul> </li> <li>• Slow cooling leads to large crystals</li> <li>• Magma remains below the earth's surface and cools slowly over months and years</li> <li>• Since the crystals remain under ground they are undisturbed and grow by adding atoms according to a regular pattern</li> <li>• More rapid cooling leads to small crystals <ul style="list-style-type: none"> <li>○ Rapid cooling takes place on the surface</li> </ul> </li> <li>• The rapid cooling does not allow for the growth of crystals</li> </ul>
<p><b>Minerals From Hot Water Solutions</b> How are solutions formed?</p>	<ul style="list-style-type: none"> <li>• Elements that dissolve in hot water</li> <li>• These elements are heated at a high temperature beneath Earth's surface</li> </ul>

<p>Solution -</p> <p>Explain what happens to the elements and compounds when the solution begins to cool.</p> <p>Describe the process of pure metal minerals through hot water solutions.</p> <p>vein -</p> <p>Where are minerals formed from solutions?</p>	<p>A mixture in which one substance dissolves in another</p> <ul style="list-style-type: none"> <li>• When the hot water solution begins to cool the elements and compounds leave the solution and crystallize as minerals</li> <li>• Silver is an example of this process</li> <li>• When pure metals crystallize they often form veins</li> <li>• Deep underground, solutions of hot water and metals often follow cracks within the rock</li> <li>• Then the metals crystallize into veins <ul style="list-style-type: none"> <li>○ Resemble streaks of fudge in vanilla fudge ice cream</li> </ul> </li> </ul> <p>A narrow channel or slab of a mineral that is much different from the surrounding rock</p> <ul style="list-style-type: none"> <li>• Mid-Ocean Ridge (Divergent plate boundaries) <ul style="list-style-type: none"> <li>○ The ocean water seeps down through the cracks in the crust</li> <li>○ The water heats to an extremely high temperature and dissolves the minerals from the crust</li> <li>○ The solution rushes upward and billows out of vents called "<i>chimneys</i>"</li> <li>○ When the hot solution hits the cold sea water crystallizes on the ocean floor</li> </ul> </li> </ul>
<p><b>Minerals Formed by Evaporation</b></p> <p>Describe the process of minerals forming from evaporation.</p>	<ul style="list-style-type: none"> <li>• Earth's water (oceans) slowly evaporate over millions of years</li> <li>• When the water evaporates crystallized minerals are left behind <ul style="list-style-type: none"> <li>○ Example: <ul style="list-style-type: none"> <li>▪ Salt crystals that are left behind in a beaker after the water has dissolved</li> </ul> </li> </ul> </li> </ul>

<p>3 Minerals formed by the evaporation of sea water</p>	<ol style="list-style-type: none"> <li>1. <u>Gypsum</u> uses: <u>Building materials</u></li> <li>2. <u>Calcite crystals</u> uses: <u>Microscopes</u></li> <li>3. <u>Potassium</u> uses: <u>Fertilizers</u></li> </ol>
<p><b>Where Minerals Are Found</b> How are less common and rare minerals distributed throughout Earth?  Many of Earth's valuable minerals are found in these areas.</p>	<ul style="list-style-type: none"> <li>• <b>Less common and rare minerals are not evenly distributed throughout Earth</b> <ul style="list-style-type: none"> <li>○ This is why they are less common and rare</li> </ul> </li> </ul> <ol style="list-style-type: none"> <li>1. <u>Volcanic activity</u></li> <li>2. <u>Mountain building - Andes mountains, Chile</u></li> </ol>