DATE: NAME: CLASS:

CHAPTER 14	Thought Lab 14.1: Nanotubes, Buckyballs, and Allotropes	BLM 14.1.1
HANDOUT		

The serendipitous discovery of fullerenes in 1985 revealed the existence of a third form or **allotrope** of pure carbon. Interest in fullerenes has been intense since the discovery of this unusual form of carbon. You are already familiar with the use of graphite in pencils, and you may be aware that, in addition to being used in jewellery, diamonds are used extensively in industrial applications. How much do you know about fullerenes? The physical properties of graphite and diamond are almost the complete opposite of each other. How do the physical properties of fullerenes compare with those of diamond and graphite? Where do nanotubes fit in with these allotropes?

Procedure

Use library and electronic research tools to find answers for the following questions:

1. What is the origin of the name *fullerene* for this third allotrope of carbon?

2. What are the physical properties (electrical, structural, hardness, colour) of graphite and of diamond?

3. What are the electrical properties of fullerenes? How do those properties compare with the electrical properties of diamond and graphite?

Copyright © 2007, McGraw-Hill Ryerson Limited, a Subsidiary of the McGraw-Hill Companies. All rights reserved.
This page may be reproduced for classroom use by the purchaser of this book without the written permission of the publisher.

Thought Lab 14.1: Nanotubes, Buckyballs, and Allotropes (continued)

4. What are the physical characteristics of a carbon nanotube? What are three technological uses for nanotubes?

Analysis

1. Diamond is one of the hardest known substances, and graphite one of the softest. Yet most of the carbon–carbon bonds in both graphite and diamond are approximately equal in strength. How can diamond be so much harder than graphite?

2. What effect is the physical structure of a nanotube predicted to have on the structural strength of carbon composites?

Copyright © 2007, McGraw-Hill Ryerson Limited, a Subsidiary of the McGraw-Hill Companies. All rights reserved.
This page may be reproduced for classroom use by the purchaser of this book without the written permission of the publisher.

Thought Lab 14.1: Nanotubes, Buckyballs, and Allotropes (continued)

3. Is it appropriate to describe a nanotube as merely a special case of a fullerene? Explain.

Copyright © 2007, McGraw-Hill Ryerson Limited, a Subsidiary of the McGraw-Hill Companies. All rights reserved.
This page may be reproduced for classroom use by the purchaser of this book without the written permission of the publisher.