

Automotive Technology 5th Edition

Chapter 20 Coolant

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This Automotive Technology 5 th text provides complete coverage of automotive components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students as listed: <ol style="list-style-type: none"> 1. Discuss coolant fundamentals. 2. Compare the different types of coolant. 3. Discuss coolant freezing/boiling temperatures. 4. Discuss coolant testing and coolant replacement issues.
Establish the Mood or Climate	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

NOTE: This lesson plan is based on the 5th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 20: [ATE5 Chapter Images](#)

ICONS



CH20 COOLANT

1. SLIDE 1 CHAPTER 20 COOLANT

Check for **ADDITIONAL VIDEOS & ANIMATIONS**
@ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

COOLANT

<http://www.youtube.com/watch?v=ODwfBDvWxmU>

2. **SLIDE 2 EXPLAIN Figure 20-1** Graph showing the relationship of the freezing point of the coolant to the percentage of antifreeze used in the coolant.
3. **SLIDE 3 EXPLAIN Figure 20-2** Graph showing how the boiling point of the coolant increases as the percentage of antifreeze in the coolant increases
4. **SLIDE 4 EXPLAIN Figure 20-3** Havoline was the first company to make and market OAT coolant. General Motors uses the term DEX-COOL.

DEMONSTRATION: Show students examples of coolant colors. Explain that coolant spills should be cleaned up immediately since they are very slick and can be hazardous.

SAFETY TIP: Never leave open coolant containers where animals can reach them. Animals enjoy sweet taste of coolant & drink it. Coolant can kill pets. Even embittered coolant should not be left around animals. Even though animals may not like taste of this coolant and so may not drink it, they still may lick it and become ill.

DISCUSSION: Discuss how the mixing of types of coolants may harm the system. Discuss with students some examples of manufacturer issues with DEX-COOL. Who was the first OEM to use DEX-COOL?

5. **SLIDE 5 EXPLAIN Figure 20-4** Coolant used in Fords that use Mazda engines and in Mazda vehicles. It requires the use of a **PHOAT** coolant which is dark green.
6. **SLIDE 6 EXPLAIN Figure 20-5** Not all embittered coolant is labeled embittered.

ICONS



CH20 COOLANT

DISCUSSION: Discuss the importance of a proper coolant and water mix, and the problems that arise from incorrect mixtures.

DISCUSSION: Discuss with students why the freezing point and the boiling point are not the only things to check when testing coolant. What is the difference between freezing & boiling point?

7. **SLIDE 7 EXPLAIN FIGURE 20-6** Checking the freezing temperature of the coolant using a hydrometer.
8. **SLIDE 8 EXPLAIN FIGURE 20-7** Using refractometer is an accurate method to check freezing point of coolant
9. **SLIDE 9 EXPLAIN FIGURE 20-8** meter that measures actual pH of coolant can be used for all coolants, unlike many test strips that cannot be used to test pH of red or orange coolants
10. **SLIDE 10 EXPLAIN Figure 20-9** Galvanic activity is created by two dissimilar metals in contact with a liquid, in this case coolant.

DISCUSSION: Discuss with students why galvanic activity was not a big problem with the older steel engines.

DEMONSTRATION: Show students how to test for electrolysis in cooling system.

Coolant colors vary even within OEMS models. Color has no bearing on the service life of the coolant. Most OEMS recommend using distilled water, not tap water, in cooling systems. Distilled water does not have all the chemicals that can harm your cooling system.

Electrolysis in cooling system can create corrosion that destroys components from the inside out

HANDS-ON TASK: Have students use test strips to verify the coolant condition

ICONS	CH20 COOLANT
	<p><u>SEARCH INTERNET</u> research the Internet to find out which coolants are organic acid technology types besides DEX-COOL. Have students research which states require embittered coolant other than California and Oregon. Have them share their findings in class.</p>
	<p><u>ON-VEHICLE NATEF TASK</u> Test and Replace Coolant (A1-D-7, A7-C-5) PG 44 Coolant Flush (A7-C-6) PG 45</p>
	<p><u>HOMEWORK</u> <u>CROSSWORD PUZZLE (MICROSOFT WORD) (PDF)</u> <u>WORD SEARCH PUZZLE (MICROSOFT WORD) (PDF)</u></p>

Crossword