

Automotive Heating and Air Conditioning, 8e

Chapter 4 Refrigerants and Refrigerant Oils

Opening Your Class






KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Automotive Heating and Air Conditioning, 8e . It correlates material to task lists specified by ASE and NATEF/ASEE Education.
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. <ol style="list-style-type: none">1. Prepare for the ASE Heating and Air Conditioning (A7) certification test content area "A" (A/C System Service, Diagnosis and Repair).2. Discuss the depletion of the ozone layer and the resulting issues of global warming.3. Explain the impact of legislative laws on automotive A/C systems.4. Discuss identifying refrigerants and proper storage container.5. State the changes considered for future refrigerants.6. Explain refrigerant safety precautions.7. Discuss the different types and viscosities of refrigerant oils.
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 8th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 04:

<http://www.jameshalderman.com/links/book hvac/ci/hvac ci ch 4.pptx>

These Power Point files contain more than just the images.

ICONS	Ch04 Refrigerants and Refrigerant Oils
 	<p>SLIDE 16 FOR FIGURE 4-7 IS OUT OF SEQUENCE IN THE SLIDE PRESENTATION WITH 4-7 COMING AFTER FIGURE 4-9.</p>
	<p>16. SLIDE 16 EXPLAIN Figure 4-7 R-1234yf refrigerant is sold in white containers with a red stripe.</p> <p>17. SLIDE 17 EXPLAIN Carbon Dioxide as a Refrigerant</p> <p>18. SLIDE 18 EXPLAIN FIGURE 4-10 label on a Toyota Fuel Cell Hybrid Vehicle (FCHV) showing that CO₂ (R744) is being used as the refrigerant</p> <p><u>DISCUSSION: ASK STUDENTS TO DISCUSS IS CARBON DIOXIDE (CO₂) A GOOD REFRIGERANT?</u></p>
	<p>19. SLIDE 19 EXPLAIN Alternative Refrigerants</p> <p>20. SLIDE 20 EXPLAIN Secondary Loop Systems</p>
	<p>21. SLIDE 21 EXPLAIN FIGURE 4-11 secondary loop A/C system keeps the potentially dangerous or flammable refrigerant out of the passenger compartment by using a chiller/heat exchanger to cool an antifreeze and water mixture. This fluid then transfers heat from the cooling core in the air distribution section to the chiller.</p>
	<p>22. SLIDES 22-24 EXPLAIN Refrigerant Safety Precautions</p> <p><u>DEMONSTRATION: SHOW TESTER FOR IDENTIFYING REFRIGERANT GASES</u></p>
	<p><u>DISCUSSION: ASK STUDENTS TO TALK ABOUT THE TYPES OF REFRIGERANTS THAT HAVE BEEN USED IN AUTOMOTIVE SYSTEMS AND IN RESIDENTIAL HOME AC SYSTEMS. HOW DO THESE REFRIGERANTS WORK? WHY IS CFC-12 NO LONGER USED? RESIDENTIAL HOME REFRIGERANTS CAN'T BE USED IN AUTOMOTIVE SYSTEMS, EXCEPT IN BUSES.</u></p>
	<p>25. SLIDE 25 EXPLAIN Figure 4-12 When recovering refrigerant, the container should be filled to a maximum of about 80%.</p>

ICONS	Ch04 Refrigerants and Refrigerant Oils
	<p><u>DISCUSSION:</u> ASK STUDENTS TO TALK ABOUT ROLE OF <u>REFRIGERANT OILS</u> IN LUBRICATING COMPRESSOR. WHAT ARE THE TYPES OF REFRIGERANT OIL AND THEIR CHARACTERISTICS? HYBRID VEHICLES OFTEN USE SPECIAL OIL THAT IS NONCONDUCTIVE. USING WRONG OIL COULD CAUSE DEATH OR INJURY FROM ELECTRICAL SHOCK. SYSTEMS USE 200 VOLTS TO DRIVE COMPRESSOR RATHER THAN A BELT.</p> <p>26. SLIDES 26-27 EXPLAIN Refrigerant Oils</p> <p>28. SLIDE 28 EXPLAIN FIGURE 4–13 container of refrigerant, which is a replacement for R-12 or R-134a and contains R-134a but also butane, a flammable gas.</p> <p>29. SLIDES 29-30 EXPLAIN Summary</p>