


## Alternative Refrigerant Mineral Oil Miscibilities

In order for mineral oil (used in R12 systems) to return to the compressor properly, the oil and refrigerant must be miscible (dissolve) in each other. Automotive systems use "thick" oil, 500-525 viscosity. This oil is bright yellow and is easy to see. Stationary systems use a much thinner oil, harder to see, that is 150 viscosity. Thinner mineral oils dissolve easier in refrigerants than thicker oils. The colder the temperature is, the harder it is (for mineral oils) to maintain miscibility. If the refrigerant/oil combination is immiscible (not miscible), then the oil floats in a layer on top of the refrigerant. In a real system, with the oil and refrigerant combination not miscible in each other, may result in the oil being "trapped" in the evaporator, thus starving the compressor for oil and failing the compressor.

**Five ml of oil added, air evacuated, then about 20 ml of liquid refrigerant was added to the test vessel.**

**500 viscosity mineral oil at 32 degrees F (evaporator temp in cars)**

				
R12: GOOD	R406A: GOOD	HOTSHOT: POOR	FR-12: none	Freeze12:none

**150 viscosity mineral at 0 degrees F (except as noted) (stationary refrigeration)**

					
R12: GOOD	R406A: GOOD	HOTSHOT: POOR	FR12: (35F) NONE note 1	Freeze12: NONE	FX-56 (R409A): POOR+

150 viscosity mineral oil at -40 degrees F (ultra low temp)



Room Temp (70 degrees F), 500 viscosity mineral oil - not much significance - FRIGC FR12 and FREEZE12 are still not miscible!



**Note:** MP39/66/52 [R-401/A/B/C] were not tested since their manufacturer states they have poor mineral oil miscibility and they advise to change to Alkylbenzene (AB) oil from mineral oil. They have adequate miscibility in AB oil.

**Note 1:** FRIGC FR-12 appeared to be completely non miscible in mineral oil at just about any temperature so it was only tested at 70 deg F and 35/32 deg F (150 & 500 oil), since any colder would produce the same results. Freeze12 exhibited similar non miscible behavior (similar to R-134a).