

Metals commonly used in a piston aircraft engine.

I've seen this data floating around the pilots forums before and I keep it in my oil analysis trending spreadsheet.

- **Aluminum (Al)** Thrust washers, bearings and pistons are made of this metal. High readings can be from piston skirt scuffing, excessive ring groove wear, broken thrust washers, etc.
- **Boron, Magnesium, Calcium, Barium, Phosphorous, and Zinc**
These metals are normally from the lubricating oil additive package. They involve detergents, dispersants, extreme-pressure additives, etc.
- **Chromium (CR)** Normally associated with piston rings. High levels can be caused by dirt coming through the air intake or broken rings.
- **Copper (CU), Tin** These metals are normally from bearings or bushings and valve guides. Oil coolers also can contribute to copper readings along with some oil additives. In a new engine these results will normally be high during break-in, but will decline in a few hundred hours.
- **Iron (Fe)** This can come from many places in the engine such as liners, camshafts, crankshaft, valve train, timing gears, etc.
- **Lead (Pb)** Use of regular gasoline will cause very high test results. Also associated with bearing wear, but fuel source (leaded gasoline) and sampling contamination (use of galvanized containers for sampling) are critical in interpreting this metal.
- **Silicon (Si)** High readings generally indicate dirt or fine sand contamination from a leaking air intake system. This would act as an abrasive, causing excessive wear. Silicon is also used as a anti-foam agent in some oils. more on silicon
- **Sodium (Na)** High readings of this metal normally are associated with a coolant leak, but can be from an oil additive package.