

## Troubleshooting Problems When Lighting an FID

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The technical department at Phenomenex is at a chromatographer's disposal regardless if the problem is column related or not. A recently asked question was: "Why won't my FID light or stay lit?"

I understand the chemist frustration because I have personally experienced this problem more times than I would like to admit. It is much more common when using newer instruments that have an EPC (electronic pressure control) devices because they utilize "smart software," which try to alert you of potential system problems.

### Flame Ionization Detectors (FID)

The instrument determines that it has succeeded in lighting the flame when the FID signal (pA) stays above the offset value (usually 2-3pA). If unexpected signal variations occur that could indicate a leak or other FID related problem, the instrument will shut itself down and alert you of the problem. In such cases, the flame may initially light, however the instrument will shut off the detector after the problem is detected (Figure 1).

### Troubleshooting

To simplify the troubleshooting process, please answer the following question: Does the FID was initially light and then go out? If the FID initially lights, a distinctive popping sound will be heard every time the instrument attempts to light the flame. When it is lit, the baseline will usually exhibit a large sharp spike (over 100 pA) that accompanies the popping (Figure 2). If the FID does not light, then it may be the result of another set of problems.

#### **FID is not lighting:**

**Problem:** The FID jet is clogged and the gasses can't get through to burn.

**Cause:** Dirty samples or prolonged use.

**Solution:** Physically remove the jet and clean it by first poking a syringe cleaning wire (or something similar) down the jet from the top to bottom (Graphite will likely fall out). It might also help to sonicate the jet in carbon disulfide to dissolve any remaining carbon.

**Problem:** The heater coil that lights the flame could be faulty.

**Cause:** The heater coil might be either disconnected or the coil has been damaged.

**Solution:** When the FID tries to light, there should be an orange glow inside the FID. If you do not see this, the filament could very likely be the cause. This can be verified by manually lighting the flame with a lighter. If the FID remains lit and operates normally the filament should be fixed/re-connected.

**Problem:** The detector gasses might be incorrect or have been changed.

**Cause:** This occurred once because one instrument we utilize has the ability to switch from helium to hydrogen as a carrier gas. The switching was done incorrectly and the higher-pressure helium flooded the hydrogen lines. Helium doesn't burn as well as hydrogen, so the gas lines had to be purged before a flame could be lit. Another reason could be that the air cylinder might have been replaced with a nitrogen cylinder.

**Solution:** Verify the composition and pressures of all detector gasses.

#### **The FID is lighting:**

**Problem:** The column flow may be too high and it is blowing out the jet.

**Cause:** This commonly occurs when switching between columns of small internal diameter (0.18, 0.25 mm) to large ID columns (0.53 mm) without changing software settings.

**Solution:** Select the 'total flow' option in the operating software that will subtract the column flow from the total expected make-up flow to give a corrected make-up flow.

**Problem:** The FID is too cold to light.

**Cause:** Setting might have been changed without your knowledge.

**Solution:** The FID has to be above a certain temperature for the FID to light. If the instrument is set at or below the cut off temperature the instrument might have problems keeping the flame lit. Increase detector temperature above the cutoff value.

#### **The FID sometimes light, sometimes not:**

**Problem:** The column is installed too far into the detector.

**Cause:** As the detector nut is tightened, it forces the column end into the jet.

**Solution:** If the column is installed too far into the inlet, the make-up flow is blocked and the FID will not operate effectively. In this case, the flame will not typically light. If it does light it will be easily blown out by drafts in the lab.

**Problem:** One or more of the FID gasses is low or out.

**Cause:** Filters or leaks can decrease downstream gas pressures.

**Solution:** The instrument will need to keep a minimum pressure to maintain the assigned gas flows. If the correct pressure can't be reached because the cylinder is low or supply pressure is insufficient, the instrument will try a few times and then abort the



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process. Make sure that the supply lines have at least 40psi of gas in them. This includes the hydrogen, the make-up gas that might be helium, and the air. The air might need a slightly higher pressure because the flow demands are higher for the air than the other gasses. If the instrument has enough gas to light the flame but not enough to maintain the set parameters, the flame will light and the popping sound will be heard but the instrument will still shut off the flame automatically. Check the gas pressures on the front of the instrument while the flame is being lit and make sure that the actual flows matches the set flow throughout and after the lighting process.

**Problem:** The FID signal might be lower than the cutoff.

**Cause:** This is usually the case when the 'offset' is previously set to a high value. If the detector has been cleaned or baked recently, the background may decrease to a signal that is lower than previously obtained.

**Solution:** Reset the offset value to 0 and the FID will stay lit. The value can then be properly set to decrease the baseline height.

**Problem:** The FID could be very contaminated resulting in an abnormally low signal.

**Cause:** Dirty samples or prolonged use.

**Solution:** This might be the cause if the flame is lighting and the signal is still very low. A thorough FID cleaning should increase the sensitivity of the FID and increase the signal above the minimum threshold.

**Problem:** The gas flows are incorrectly set.

**Cause:** Settings might have been changed when loading a new method.

**Solution:** The optimum hydrogen flow is 35 mL/min with an air flow of ~350 mL/min and a makeup of ~35 mL/min. See your instrument manual for precise values. In most cases the flame will light briefly and then be blown out.

**Problem:** There could be a large gas leak in the detector.

**Cause:** The usual cause is an incorrectly installed column. If the column and nut don't form an effective seal, the detector gasses escape instead of being lit.

**Solution:** Leak check the detector assembly and tighten any necessary fittings.

Figure 1. Signal when flame was not successfully lit.

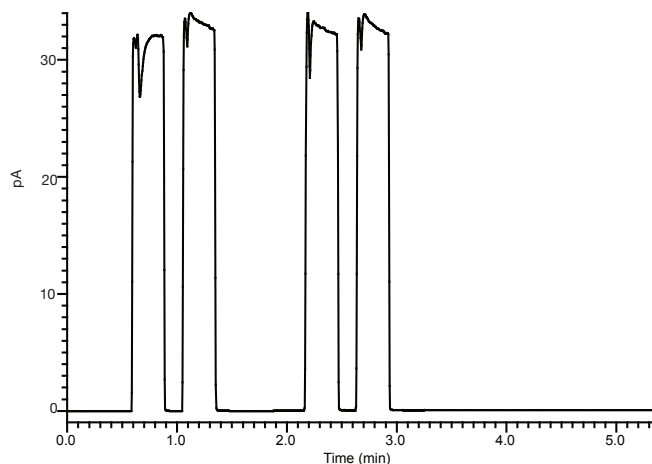


Figure 2. Signal when flame is successfully lit.

