

A FEW HELPFUL HINTS FOR STAINED-GLASS ARTISTS

Every now and again we are taken to task by stained-glass artists. Art criticism is beyond us. We cannot help you, dear friends, decide between cerise and heliotrope. We can help you if you are using the Hakko 456 irons. This iron is rated at 1110⁰ F., which is more than sufficient to cause partial combustion of certain fluxes. When this happens, nasty deposits form on the tip, it won't wet and the solder won't flow.

We offer the following suggestions:

Because the tip temperature is in excess of 1000 degrees Fahrenheit, we suggest that you use a high-temperature flux. This will prevent carbon deposits from forming on the tips as a result of partial combustion.

If you wish to do so, you can plug your Hakko iron into a VARIAC[®] or similar adjustable transformer, and reduce the output voltage to 100 volts AC. This will reduce the tip temperature to 924 degrees and should eliminate the carbonizing problem.

Another point which may help teachers and practitioners of the arcane mystery:

Keeping your tips clean and free from unwanted deposits will not only improve the performance of your soldering iron, but also increase tip life. We recommend the Hakko 599 'Brillo pad' tip cleaner, as it works very well and does not transfer garbage to the tip, as will a sponge. Under no circumstances should you use washing soda (or any other corrosive chemical), sandpaper, emery cloth or a bastard rasp to clean your tip.

It is also a good idea, in these litigious times, to provide yourself, your compatriots, and your students if any with fume-extraction equipment. Solder smoke does contain irritants, and some people are more easily irritated than others. While a few fans in the room and an open window or two may dispel the smoke well enough, it is often impractical (one wouldn't open the window in Moose Jaw in February, for example) and the wind could blow all that stuff right back inside, along with dirt, leaves, medium-sized birds and miscellaneous. Hakko offers for your consideration two types of fume extractor:

1. The Hakko 493/HJ3008, fitted with an activated carbon filter pad and a small muffin fan to move the air through the filter. The two are identical in operation and efficiency; the difference is in the mounting. The 493 sits on the bench, whilst the HJ3008 is mounted on a boom. For individual operations or intermittent use, this may be your best bet.
2. The Hakko HJ3100. This, Hakko's mainstay in the field, has a hospital-grade HEPA filter with a portion of activated carbon built in, and a vast selection of accessories. Up to four stations may be deodorized simultaneously.

YOU GOTTA EAT A PECK O' DIRT BEFORE YOU DIE.

Response to a query from a perplexed user.
(Emphases mine.)

Dear Old Doc Hakko:

In Oct. 1999, I talked with you by phone regarding "lead in the air" as a result of soldering with tin/lead solders and you were good enough to research my question and answer via (sic) FAX. I teach stained glass classes in our adult ed. Program, which uses public school classrooms. In spite of having OSHA in during a soldering class to do air and wipe sampling, which resulted in a report of no occupational hazard and no lead residue, a hysterical teacher and a parent threatening legal action against the school district have shut down my classes pending the presentation by me of hard scientific data to show the classes are not creating a health hazard to the teachers and students. I am contacting you again because you design Hakko's fume extractors and because of a Hakko brochure, which was included with my HJ3008 absorber entitled "Get All Your Soldering Fumes Under Control" which contains a chart of "Other Hazards Due to Solder Smoke". Antimony, arsenic, lead, cadmium and tin are listed as some of those hazards. So my question is, are they or are they not present in solder smoke under usual soldering conditions in stained glass work e.g. low wattage irons controlled by rheostats?

I am deeply appreciative of any help you can offer me in this matter.

Sincerely, (name withheld)

You gotta eat a peck o' dirt before you die. That's what my old Grandma used to say. She lived to be 100, ate, drank, smoked, and chewed whatever she damned pleased, and would have thrown to-day's panic-mongers to the dog if they had been around

in her time. She never soldered anything in her life, but that's beside the point. I am going to offer a very few words about fume extraction, holding fast to the wan hope that this article will help disabuse the public of some fallacious fears, and give some cogent and timely information in their stead.

Metals do not normally find their way into solder smoke. It is possible that, under proper circumstances, a hot spot may form in the solder, causing a bubble of gas to burst and flinging infinitesimal amounts of metallic particles into the air, there to adhere to bits of burnt flux and enter the atmosphere - though both chemical and spectroscopic tests conducted to prove or disprove the allegation have been inconclusive. If one is concerned about these particles, a fume extractor of the mass-flow type, carrying a filter of at least 95% efficiency per the DOP test, is recommended.

Herewith a table showing the salient characteristics of metals found in solder:

TABLE I.
CERTAIN PROPERTIES OF METALS COMMONLY FOUND IN SOLDERS.

METAL	MELTING POINT		BOILING POINT		TOXIC? ¹
	°C	°F	°C	°F	
LEAD	327.4	621.3	1620	2948	YES (A)
TIN	231.9	449.4	2260	4100	NO
ANTIMONY	630.5	1166.9	1380	2516	EMETIC (B)
INDIUM	155	311	1430	2606	UNKNOWN (F)
BISMUTH	271.3	520.3	1560	2840	SLIGHTLY (C)
COPPER	1083	1981.4	2300	4172	NO
SILVER	960.5	1760.9	1950	3542	NO
ARSENIC	*	*	*	*	YES (D)
CADMIUM	320.9	609.6	767	1413	YES (E)
ZINC	419.5	787.1	907	1665	NO

*ARSENIC DOES NOT 'MELT'. IT SUBLIMATES - THAT IS, PASSES DIRECTLY FROM THE SOLID TO THE GASEOUS PHASE AT 613° C. (1135°F.).

- (A) LEAD IN SUFFICIENT QUANTITIES CAN CAUSE BRAIN DAMAGE IN HUMANS AND OTHER EXPERIMENTAL ANIMALS. LEAD, EVEN IN TRACE AMOUNTS, ALSO CAUSES HYSTERICAL REACTIONS IN ENVIRONMENTALISTS AND HEALTH FASCISTS.
- (B) ANTIMONY IS CHEMICALLY RELATED TO ARSENIC. ANTIMONY COMPOUNDS ARE USED IN MEDICINE TO INDUCE VOMITING.
- (C) BISMUTH COMPOUNDS MAY CAUSE RESPIRATORY IRRITATION. INSUFFICIENT DATA SO FAR.
- (D) WE ALL KNOW THAT ARSENIC IS QUITE POISONOUS, OPERATING UPON THE CENTRAL NERVOUS SYSTEM. FORTUNATELY IT IS ONLY FOUND IN INFINITESIMALLY SMALL AMOUNTS IN SOLDERS.
- (E) THE EFFECTS OF CADMIUM POISONING ARE SIMILAR TO THOSE OF MERCURY POISONING. CHRONIC MERCURY POISONING, WHICH OCCURS WHEN SMALL AMOUNTS OF THE METAL OR ITS FAT-SOLUBLE SALTS, PARTICULARLY METHYLMERCURY, ARE REPEATEDLY INGESTED OVER LONG PERIODS OF TIME, CAUSES IRREVERSIBLE BRAIN, LIVER, AND KIDNEY DAMAGE. DO NOT EAT ANY CADMIUM IF YOU CAN HELP.

INDIUM IS TOO 'NEW' AS A COMMERCIAL METAL TO HAVE ACQUIRED A SHADY REPUTATION, BUT ALL THE EXPERTS ADVISE THOSE EXPOSED TO IT, HANDLING IT, OR IN THE SAME ROOM WITH IT TO TREAT IT WITH RESPECT.

¹ IF YOU BELIEVE WHAT YOU READ IN THE PAPERS, EVERYTHING IS TOXIC THESE DAYS. ESPECIALLY FOOD, EXCEPT FOR TOFU AND BRUSSELS SPROUTS. THIS COLUMN ONLY INDICATES THOSE MATERIALS THAT ARE REALLY TOXIC, NOT THE ONES THAT WILL KILL YOU IF YOU EAT FORTY POUNDS OF THEM A DAY.