

# LabPulse® Laboratory Microwave FAQs & Protocols

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## Microwave Do's and Don'ts

### Always...

- Use the laboratory microwave for laboratory work only
- Connect the canber venting system to the external fume removal system of your lab
- Use only manufacturer-approved containers in the microwave
- Use vented or uncovered containers when not using vacuum
- Handle containers after processing with potholders or thermal mitts
- Run control samples, when available

### Never...

- Use a kitchen microwave for laboratory work
- Cover containers tightly
- Use Xylene in the laboratory microwave
- Operate the microwave without a sample load in process
- Use metal accessories inside the unit
- Heat food in the laboratory microwave
- Breath in any warm fumes generated in the microwave

## General FAQs

### 1. Do Microwaves Heat All Materials Equally?

- A. No. Microwaves heat polar material like water and alcohol, and don't heat non-polar material like paraffin and fats. This is why we strongly encourage users to incorporate [Polar Heat™ Sheets](#) into their paraffin processing steps. Some fats are actually emulsions or other associations with polar components, so they can heat. Materials like Pyrex can be slightly polar and can absorb microwave energy, and metal can cause "arcing" (sparking).

### 2. My "Microwave Transparent" Containers Are White Plastic. Is This Right?

- A. "Microwave transparent" isn't synonymous with "optically transparent." It means the material allows the passage of microwaves without converting a significant portion to heat. Many materials that we wouldn't think of as "transparent," like opaque white Teflon are, in fact, "microwave transparent."

### 3. Are Staples From A Tissue Sample OK To Put In The Microwave?

- A. Yes, usually. Larger amounts of metal are to be avoided. With staples, do ensure that multiple staples aren't right next to each other, and that no staple is close to a metal temperature probe, or arcing can occur. Occasionally staples can overheat, however. Make very sure they stay immersed in solution to minimize this effect.

### 4. Do I Need To Worry About Microwave Radiation Exposure?

- A. No. Microwave radiation is not ionizing radiation like X-Rays. Microwave energy is more akin to radio waves, is not mutagenic, and effects are not cumulative. And equipment standards have been developed to assure safety, assuming that your microwave has been properly maintained and regularly inspected, and is not damaged.

### 5. Can I Use Xylene In The Microwave?

- A. It produces hazardous vapors at room temperature, and gets worse when heated. Eliminating xylene should be a goal; it's now an officially recognized hazard to pregnant women and unborn babies. Also, it's as non-polar as paraffin, and wouldn't heat efficiently.

## 6. Isn't 82°C Too Hot For Tissue During The Paraffin Step?

- A. Not with the majority of tissue types, and not usually for the relatively short timeframes involved. Also, the tissue has already been fixed, dehydrated, and defatted; while you certainly don't want to burn or cook the tissue, 82°C isn't extreme in this context.

## 7. When Should I Apply Vacuum To My Samples?

- A. Vacuum can be used for any paraffin step Vacuum can be especially beneficial when processing thick (>4mm), fatty, or thick and fatty samples. It's used to help lower the boiling point of isopropyl alcohol remaining from the previous step, and assist its replacement by paraffin.

## 8. What Are The Power Requirements For The Laboratory Microwave?

- A. Ideally, the laboratory microwave should have its own dedicated circuit, with nothing else plugged in. High energy demand instruments should not share the same circuit as the microwave. This can cause a severe drop in magnetron output of the microwave, producing inconsistent results.

## 9. When Should I Use Agitation?

- A. Almost always. Agitation promotes even heating of reagent, preventing uneven distribution of solutes, suspensions, etc. A good example is the pink meniscus ring that forms in microwave PAS staining procedures, when agitation is omitted. This layer rises to the top due to vaporization of SO<sub>2</sub>, and agitation helps prevent this. Rarely, you may find a protocol that warns against the "damaging effects of bubbling," for example, but we have seen no evidence supportive of this claim and much evidence to the contrary. Of course, when applying vacuum to your samples during the paraffin infiltration step, air agitation should not be used.

## 10. Which Microwave Is Right For Me?

- A. You can check out a quick LabPulse® microwave comparison [here](#).

## 11. Can I Use Zinc Formalin In The Microwave?

- A. Doing so is not advisable. If you insist on using zinc formalin, make sure that the temperature probe is kept clean of zinc build-up or arcing may result.

## 12. Do I Have To Worry About “Hot Spots” In The Microwave?

- A. No. LabPulse Microwave Processors come complete with microwave stirrers built so the microwave cavity is evenly heated. This coupled with the very short power cycles (1-2 seconds), and air agitation ensures even heating of your samples.

## 13. Preventative Maintenance

- A. Maintenance for the laboratory microwaves requires very little effort. Routine cleaning of the internal cavity, door seal, air intakes, and hinges is recommended. Inspect and clean the temperature probe (if equipped) as well. You may also decide to inspect the unit with a microwave leakage detector to ensure your unit is working at peak performance.

## Microwave Tissue Processing Protocols

### 1. Small Biopsies

Step	Reagent	Temp °C	Time (min)	Preset	Vacuum
1	100% EtOH	67	5	26	Off
2	2-Propanol	74	3	27	Off
3	Paraffin	74	3	27	Optional
4	Paraffin	82	5	28	Optional

### 2. ≤ 1mm Thick Biopsies

Step	Reagent	Temp °C	Time (min)	Preset	Vacuum
1	<a href="#">Preserve™</a> or Formalin	55	4	36	Off
2	100% EtOH	67	4	37	Off
3	2-Propanol	74	4	38	Off
4	Paraffin	74	4	38	Optional
5	Paraffin	84	7	39	Optional

### 3. ≤ 3mm Thick Biopsies

Step	Reagent	Temp °C	Time (min)	Preset	Vacuum
1	<a href="#">Preserve™</a> or Formalin	55	16	31	Off
2	100% EtOH	67	8	32	Off
3	2-Propanol	74	8	33	Off
4	Paraffin	74	8	33	On
5	Paraffin	84	28	34	On

#### 4. ≤ 4mm Thick Biopsies (PreFixed)

Step	Reagent	Temp °C	Time (min)	Preset	Vacuum
1	100% EtOH	67	30	15	Off
2	2-Propanol	74	30	16	Off
3	Paraffin	74	30	16	On
4	Paraffin	82	30	18	On

#### 5. Fatty/Thick Tissue Samples (PreFixed)

Step	Reagent	Temp °C	Time (min)	Preset	Vacuum
1	90% EtOH	67	30	15	Off
2	100% EtOH	67	30	15	Off
3	2-Propanol	74	30	16	Off
4	Paraffin	82	30	16	On
5	Paraffin	82	45	17	On

## Microwave-Enhanced Decalcification Protocols

### 1. < 3mm Bone Marrow Decalcification

Step	Reagent	Temp °C	Time (min)	Preset
1	Zinc Formalin	40	30	12
2	Wash in Water		10	
3	Decal (Biocare)	40	30	12

### 2. 3-5mm Bone Marrow Decalcification

Step	Reagent	Temp °C	Time (min)	Preset
1	Zinc Formalin	40	60	13
2	Wash in Water		10	
3	Decal (Biocare)	40	30	12

## Microwave-Enhanced Special Staining Protocols

### 1. Acid Fast Bacteria (AFB)

See [Product Insert](#)

### 2. Gomori Trichrome

See [Product Insert](#)

### 3. Periodic Acid Schiff (PAS)

See [Product Insert](#)

### 4. Alcian Blue

Step	Reagent	Temp °C	Time
1	Zinc Formalin (Microwave)	60	45 (sec)
2	Wash in Water		
3	Continue to 2 <sup>nd</sup> Eosin Step		

### 5. Rapid Mucin

Step	Reagent	Temp °C	Time
1	Weigert Iron Hematoxylin		1 (min)
2	Wash in Water		1 (min)
3	Fast Green FCF (Microwave)	60	30 (sec)
4	Acetic Acid Rinse		1-2 (sec)
5	0.5% Basic Fushsin (Microwave)	60	30 (sec)