Chemical Resistance Report for Acrylic (PMMA) Aquarium Sheet

1. General Chemical Properties:

Property	Value
Chemical Name	Polymethyl Methacrylate (PMMA)
Common Trade Names	Acrylic
Structure	Thermoplastic polyester (methyl methacrylate polymer)
Chemical Formula	$(C_5O_2H_8)_n$

2. Resistance Categories

- Resistant (can withstand long-term exposure)
- Limited Resistance (short-term or diluted exposure only)
- Not Resistant (causes degradation, cracking, or crazing)

3. Excellent Chemical Resistance

Chemical	Comments
Water (fresh/salt)	Ideal for aquariums
Dilute acids (e.g., HCl <10%)	Resistant to occasional contact
Alkaline solutions (dilute NaOH)	Moderate exposure acceptable
Alcohols (ethanol, isopropanol)	Short-term contact only
Bleach (sodium hypochlorite <5%)	Brief contact, rinse afterwards
Detergents (non-abrasive)	Generally safe

4. Limited Resistance

Chemical	Comments
Ammonia (aqueous <10%)	Can cause stress cracking
Hydrogen peroxide (<3%)	Short-term safe
Acetic acid (vinegar)	Tolerated in low concentrations
Salt solutions (e.g., NaCl)	Safe, but avoid long-term saturation at joints
Organic solvents (low % acetone)	May soften or craze surface

5. Not Chemically Resistant

Chemical	Effect on Acrylic
Acetone	Rapid softening, cracking
Chloroform / Dichloromethane	Dissolves acrylic
Benzene, Toluene	Swelling, crazing, cracking

Strong acids (H_2SO_4, HNO_3)	Can etch or degrade surface
Chlorinated hydrocarbons	Solubilize or stress-crack acrylic
Gasoline, Diesel	Degrades surface over time

6. Recommendations for Aquarium Use

Condition	Guidance
Cleaning	Use only mild soap and water. Avoid alcohols and solvents.
Water additives	Check compatibility (e.g., copper or iodine additives are generally safe)
Disinfection	Use diluted bleach (max 5%) or hydrogen peroxide (3%), rinse thoroughly
Bonding/Repair	Use acrylic-compatible cement (e.g., Weld-On 3 or 16)
Avoid	Solvent-based paints, adhesives, strong industrial cleaners

7. Failure Modes from Chemical Exposure

- Crazing: Fine cracks on surface due to stress and solvent interaction
- Swelling: Structural deformation after prolonged chemical contact
- Discoloration: UV or reactive chemical exposure can yellow the sheet
- Delamination (in multi-layered sheets): After long-term solvent or moisture exposure

8. Standards & References

- ASTM D543: Standard for evaluating chemical resistance of plastics
- ASTM D785: Rockwell hardness of plastics
- ASTM D256: Impact resistance of plastics
- Manufacturer Datasheets (Selexible™ Acrylic)