

Quats – Green Chemistry Perspectives

ADBAC/DDAC Issues Steering Committee

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Quats – Green Chemistry Issues

- Topics
 - Common disinfectant actives
 - Importance of disinfectant capabilities and limitations
 - Difference between a concentrate and a ready to use (RTU) disinfectant
 - Environmental benefits for quats being highly concentrated

Common Disinfectant Actives

Citric Acid	Hydrogen Peroxide	ADBAC & DDAC
Only acidic formulations	Only acidic formulations	Acid, neutral and alkaline formulations
Only Ready-To-Use	Only Ready-To-Use	Dilutable Concentrates & Ready To Use
Active use ranges from 0.7% to 6%	Active use ranges from 0.5% - 7.0%	Active use ranges from 0.06% to 0.3%
Lactic Acid	Peroxyacetic Acid	Ethanol/Isopropanol
Only acidic formulations	Only acidic formulations	Highly Flammable
Only Ready-To-Use	Dilutable Concentrates & Ready To Use	Only Ready-To-Use
Active use ranges from 0.5% – 5.0%	Active use ranges from 0.01% to 25%	Active use ranges >60%, when used as only active
	Pungent odor	

Importance of Disinfectant Properties

• Capability

- Acidic – good for specific soils and some hard water residue removal
- Oxidizers/peroxy materials – Usually more aggressive towards spores and other hard to kill microorganisms.
- Biocidal – Used in the needed settings help kill harmful pathogens benefitting public health

• Limitation

- Use on metal equipment is limited due to damage. Replace items more frequently.
- Aggressive nature can cause material damage on surfaces. Higher reactivity can reduce product shelf life.
- Biocides for hard surfaces are not selective to microorganisms in all cases. Easily neutralized versions aid biodegradation and limit unwanted activity.

Disinfectant Quat Formulations

How Used



Dilutable Concentrate

- 1% to 25% active Quat
- Balance water and EPA approved inerts



Ready to Use – Solution

- Quat active, 0.06% to 0.3%
- Balance water and EPA approved inerts
- User uses product as-is
- Typical users Household, Industrial & Institutional
- Apply to surface by spray, wipe

Dilut. Concen – Use Solution

- Quat active level at use, 0.06% to 0.3%
- User dilutes concentrate in water to prepare use solution
- Typical users Industrial & Institutional
- Apply to surface by mop, spray

Quat Packaging Options

One 5-gallon pail of concentrate scenario

- **Concentrate (1:256)**

- One 5 gallon Pail of a 1:256 Dilutable Concentrate
- Diluting 1 oz of concentrate with 2 gallons of water = 1,280 gallons disinfectant
- Effective disinfectant with a lower carbon content, reusable containers from mop buckets to spray bottles
- Net container use
 - 1 x 5 gallon pail,
 - 2 to 5 - mop buckets,
 - 2 to 12 plastic spray bottles with trigger sprayers

- **Ready to Use (RTU)**

- Same quantity of disinfectant –
 - 1,280 gallons
- Net container use
 - This would arrive in 5,120 plastic quart pump spray bottles with trigger sprayers
 - Approximately 425 boxes with a dozen bottles.

Quat Transportation Benefits

Truckload of Concentrate Pails vs.
Quart Bottles of RTU from those pails

Concentrate

- 888 - 5 gallons pails can go on a single truckload based on weight
- Truck: $40,000 \text{ lbs truck capacity} / (45 \text{ lbs}/5\text{-gallon pail}) = 888 \text{ 5-gallon pails of 1:256 concentrate in 1 truckload}$

RTU Quarts

- 888 x 5 gallons pails will make 4,546,560-quart bottles of RTU disinfectant
- One truckload of concentrate pails saves shipping 227 truckloads (20,000 bottles/truck)

Concentrate use has a carbon footprint reduction of 99.5% for transportation

Concentrate use will save driving 227 truckloads full of quart bottles and cardboard boxes

Quats Points Summary

- Quats are not flammable
- They are not volatile
- Supply important for current public health needs
- Products based on quats can be highly concentrated reducing carbon footprint by up to 99.5%