The 12 Principles of Green Chemistry in action at 2Plus

2⁺ 2 PLUS

1. Prevention

It is better to prevent waste than to treat or clean up waste after it has been created.

2Plus eliminates the exposure before it occurs. Our DCI reduces the quantity of waste from your cooling system by up to 50%.

2. Atom Economy

Synthetic methods should be designed to maximise the incorporation of all materials used in the process into the final product.

All our 2Plus DCI reaction products perform a role in preventing scale, corrosion and biological growth in your cooling system.

3. Less Hazardous Chemical Synthesis

Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.

All 2Plus reactions are non-toxic, water-based and occur in the pH range 8.0 - 9.0 making it safe for people, the environment and your cooling equipment.

4. Designing Safer Chemicals

Chemical products should be designed to affect their desired function while minimising their toxicity.

Our 2Plus DCI reaction products are naturally occurring compounds, $CaCO_3$, $MgSiO_3$ and $Mg(OH)_2$ which have a net positive effect when returned to the eco-system.

5. Safer Solvents and Auxiliaries

The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.

With 2Plus no solvents are required. Electrons are cheap, pure and versatile agents which perform clean, fast reactions.

6. Design for Energy Efficiency

Energy requirements of chemical processes should be recognised for their environmental and economic impacts and should be minimised. If possible, synthetic methods should be conducted at ambient temperature and pressure.

Our 2Plus DCI operates at ambient temperature and low pressure (<1.5 Bar) and draws less than 1kWh.

7. Use of Renewable Feedstocks

A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.

With 2Plus the only feedstock is your cooling water.

8. Reduce Derivatives

Unnecessary derivatisation (use of blocking groups, protection/de-protection, temporary modification of physical/chemical processes) should be minimised or avoided if possible, because such steps require additional reagents and can generate waste.

With 2Plus no derivatives are required. The DCI process is a clean synthesis by direct oxidation and reduction.

9. Catalysis

Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.

With 2Plus, stoichiometric reagents are eliminated. Water-phase oxidants and reductants are generated in-situ.

10. Design for Degradation

Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.

Our 2Plus DCI reaction products are quickly dissolved by rain water making the minerals (Ca, Mg and Si) available for the benefit of plants and animals in the natural environment.

11. Real-time analysis for Pollution Prevention

Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.

Our 2Plus DCI intelligent controller continuously regulates the cell conditions in real time to prevent the formation of hazardous substances.

12. Inherently Safer Chemistry for Accident Prevention

Substances and the form of a substance used in a chemical process should be chosen to minimise the potential for chemical accidents, including releases, explosions, and fires.

Our reaction products are not hazardous. All 2Plus DCI reactions occur in water, at ambient temperature and low pressure making it safe for people, the natural environment and cooling equipment.

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