



This advice note has been prepared by the EHS Water Operational Unit to answer the following question:

If drinking water supplies or swimming pools are being chlorinated in accordance with current recommendations / best practice is this sufficient to inactivate COVID-19 virus?

For Drinking Water chlorination, 'current recommendations' is taken to mean a Ct value of at least 15 mg.min/litre (for example exposure to 0.5 mg/l free chlorine for at least 30 minutes).¹

For Swimming Pool chlorination, operating to 'current recommendations / best practice' means maintenance of a free chlorine residual of at least 1.0 mg/l (depending on pool type and disinfectant used).^{2,6}

Answer:

Yes - adherence to current recommended disinfection practice is sufficient to inactivate COVID-19 virus in chlorinated drinking water and swimming pools.

Rationale:

The virus, technically named SARS-CoV-2, is a newly identified virus, but it is the seventh Coronavirus known to infect humans. The resulting illness is referred to as COVID-19. This virus is in the same Coronavirus family as severe acute respiratory syndrome Coronavirus (SARS-CoV or SARS) and Middle East respiratory syndrome Coronavirus (MERS-CoV or MERS), which caused the two previous Coronavirus outbreaks.³

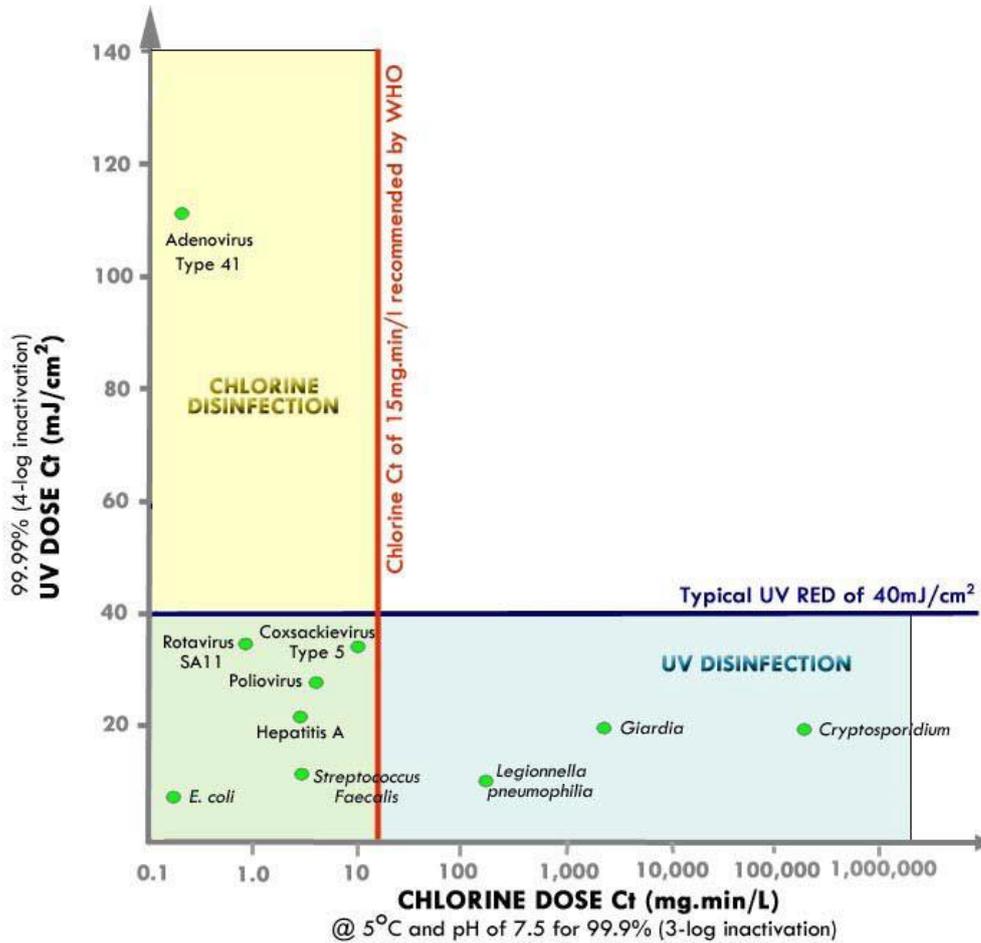
Since SARS and MERS are from the same family of coronaviruses, they have similar physical and biochemical properties and comparable transmission routes as COVID-19. In the absence of COVID-19 specific data, we rely on SARS, MERS, and coronavirus surrogate data to extrapolate, assess, and manage risk.³

Viral genetic material is packaged inside protein structures called capsids. **Viruses** are divided into three groups: **enveloped viruses** are surrounded by an outer lipid membrane; **non-enveloped viruses** (divided into large non-enveloped and small non-enveloped) lack this membrane. Where present, the **envelope** contains the **viral** proteins, which mediate binding to host cells.⁴

Crucially, enveloped viruses are easier to kill: SARS-CoV-2, the virus responsible for the COVID-19 outbreak, is an enveloped virus and therefore the easiest to kill of the three types of viruses referred to above.



For Drinking Water the diagram below⁵ sets out the relative efficacy of chlorination and UV (ultra-violet light) in the inactivation of various viruses:



Coxsackievirus, Poliovirus and Rotavirus are examples of non-enveloped viruses. It can be seen that these are inactivated at chlorine Ct of less than 15mg.min/litre, therefore an enveloped virus such as the COVID-19 virus will be inactivated at even lower Ct values.

Swimming Pools

With regard to swimming pools the same rationale applies for standards such as PWTAG 2016² and EHOA⁶ which are intended to control microbiological hazards in swimming pools treated with disinfectant.

Please note also that the minimum recommended free chlorine residual depends on the type of pool or chlorination chemical used – for example spa pools (‘jacuzzis’) need a higher residual. Refer to the relevant guides for details.

The key point is that, regardless of the type of pool, adherence to the appropriate guidelines will control risk from waterborne COVID-19 virus



REFERENCES

1. World Health Organisation recommendation quoted in Environmental Protection Agency Water Treatment Manual Disinfection 2011 page 43.
2. PWTAG Code of Practice for Swimming Pool Water – 2016 Updated to reflect the requirements of Managing Health and Safety in Swimming Pools (HSG179) jimbutterworth.co.uk/2pwtag.pdf
3. <https://www.wef.org/news-hub/wef-news/the-water-professionals-guide-to-the-2019-novel-coronavirus/> accessed 2nd March 2020
4. Select Effective Disinfectants for Use Against the Coronavirus That Causes COVID-19 <https://www.infectioncontroltoday.com/environmental-services/select-effective-disinfectants-use-against-novel-virus-covid-19> accessed 2nd March 2020
5. Environmental Protection Agency Water Treatment Manual Disinfection 2011
6. Environmental Health Standards for Swimming Pools, Spa Pools, Hydrotherapy Pools and other Multi-user Pools. Environmental Health Officers' Association ISBN No. 0-9537955-1-9