# Credence and viral control


Credence consists of troclosene (sodium dichloroisocyanurate, or NaDCC) – a stabilised form of chlorine which is quick to act on contaminants, in terms of kill time, Credence is quicker acting than many disinfectants with efficacy against enveloped viruses seen in 5 minutes or less for volatile chlorine i.e. free chlorine molecules (which is less stable than Credence) (Shirai et al., 1999). In general terms a 'fast kill rate' is deemed to be less than 15 minutes as standard.

Credence has long persistency in water, making it useful in biosecurity as well as being highly cost effective. It is also less toxic and corrosive when compared to other available disinfectants. When used at appropriate concentrations Credence is safe to use in contact with skin and ingested in drinking water, whereas other products are not. The active stabilised form of chlorine in Credence is very different compared to common disinfectants used on the farm, home and at veterinary surgeries. In solution, it has lower odour than volatile disinfectants. The WHO actively uses the same active ingredients in Credence in recent major and dangerous viral outbreaks, such as Ebola virus in Africa, and it is recommended for use in emergency situations, such as disinfection of equipment and housing (Hopman et al., 2015). Although effective hand washing with soap and water as well as using alchohol-based hand sanitisers is generally employed in disease control, the same active ingredient as Credence (troclosene) is used commonly in biosecurity and cleaning procedures in hospitals and under emergency outbreaks (Hopman et al., 2015).

Credence solubilises readily in water, where it forms chlorine derivatives (di- and mono-chloroisocyanurate) which are maintained in a 50:50 equilibrium with hypochlorous acid (HOCl+) and free chlorine (Cl-). As the free chlorine is used up, further chlorine is released from combined forms so as to maintain the 50:50 equilibrium (Kartikayan et al., 2007). In addition, Credence has a patented effervescent activity to penetrate all areas, including hard to reach parts in complicated equipment.

Viruses come in various forms, and can be defined as either enveloped or non-enveloped. Enveloped viruses, including avian influenza virus (H5N1), African swine fever virus (ASFV) and Corona virus (Covid-19) need to bind to receptors in tissues to cause infections. Free chlorine is known to rapidly penetrate the enveloped viral lipid membrane, allowing it to rapidly destroy protein in the virus, leading to genomic damage and inactivation (Ye et al., 2018). Free chlorine has been shown to affect viruses in a site-specific way that helps to prevent injection of the viral genetic material into the host cell, thereby preventing infection (Wigginton et al., 2012). However, not all chlorine forms act in the same way and have safe levels of activity. Household bleach is probably the most familiar form (Sen, 2016), although this has been shown to be less effective, more toxic, has high odour and can be more expensive than Credence.

At correct dose levels, Credence is effective across a large pH range, as well as being more effective in controlling multiple pathogens, including enveloped and un-enveloped viruses, algae, fungi, yeasts, mycoplasmas, bacteria and protozoa (Sen, 2016). The active form used in Credence ensures it has better biofilm penetration, which is not seen for bleach or other disinfectants. This means that bacteria, such a Mycoplasma spp. which produce large amounts of biofilm to protect themselves against environmental UV

light and disinfectants, are effectively controlled by Credence. In addition, most chlorine sources are volatile and so destroyed rapidly by UV light, Credence is not affected in this way due to its specific formulation, giving it long lasting persistency, both in and outdoors (Sen, 2016).

Shirai et al. (1999) demonstrated that chlorine was effective against four enveloped viruses (vesicular stomatitis, African swine fever, equine viral arteritis and porcine reproductive and respiratory syndrome virus) and responded in a dose-dependent manner. The effects were observed by electron microscopy, and showed that chlorine caused complete disintegration of the viral particles and destroyed nucleic acids. Effective concentrations of chlorine were from 0.0075%. In comparison, ammonia was much less effective and only caused the detachment of the viral envelope. More importantly volatile chlorine forms did not destroy non-enveloped swine vesicular disease virus (which is similar to foot and mouth disease) however independent data shows that Credence is effective against this foot and mouth (Anpario, personal communication). Indeed, chlorine is effective against many non-enveloped viruses, including water-borne hepatitis and human adenovirus (Girones et al., 2014).

Research on Credence has shown its efficacy against a wide range of viral and bacterial pathogens, and improved efficacy over many commonly used disinfectants. Ensuring it is applied in the correct dosage and using recommended PPE will ensure safe, effective control as part of your biosecurity programme.