

Supporting Information

The concentration of hydroquinone produced by intact cells after incubation can be described by equation (2),

$$C = \int_0^T kC(t)dt \quad (2)$$

where C is the concentration of hydroquinone, T is the incubation time, k is the respiration activity and $C(t)$ is the concentration of *p-benzoquinone* at time t . In the presence of Cu^{2+} , the respiratory activity is inhibited, and thus the equation (2) can be transformed to equation (3) to describe the concentration of hydroquinone for toxic samples.

$$C_p = \int_0^T k_p C_p(t)dt \quad (3)$$

Where C_p is the concentration of hydroquinone obtained in the presence of Cu^{2+} , and the $k_p(t)$ is the inhibited respiration activity, and $C_p(t)$ is the concentration of *p-benzoquinone* at time t . So the equation (1) can be changed to equation (4)

$$\text{Inhibition \%} = \left(1 - \frac{C_p}{C}\right) \times 100\% = \left(1 - \frac{\int_0^T k_p(t)C_p(t)dt}{\int_0^T kC(t)dt}\right) \times 100\% \quad (4)$$

At low concentration of *p-benzoquinone* and low toxicity, the $k_p(t)$ can be assumed as a constant during incubation, so the inhibition rate is determined by the changes of concentration of *p-benzoquinone* in the absence and presence of toxicants, and then the equation (4) can be transformed to equation (5),

$$\text{Inhibition \%} = \left(1 - K \frac{\int_0^T C_p(t)dt}{\int_0^T C(t)dt}\right) \times 100\% \quad (5)$$

At the early stage of incubation, the value of $\int_0^T C_p(t)dt / \int_0^T C(t)dt$ would decrease with time because of the faster increased concentration of hydroquinone (see scheme 1 in the paper) in the absence of toxicants, which results in the increasing inhibition rate.

In the following incubation, the value of $\int_0^T C_p(t)dt / \int_0^T C(t)dt$ would increase because of the exhaust of *p-benzoquinone* in the absence of toxicants, which is related with the high respiration activity of intact cells and low origin concentration of *p-benzoquinone*. The increased value of $\int_0^T C_p(t)dt / \int_0^T C(t)dt$ leads to the decreased respiration rate with time. Therefore, for mediated toxicity bioassay, the concentration of mediator and cells, the incubation time can affect the sensitivity of toxicity test.