ARTICLE

Pesticide degradation on solid surfaces: a moisture dependent process governed by the interaction between TiO_2 and H_2O

Received 00th January 20xx,
Accepted 00th January 20xx

DOI: 10.1039/x0xx00000x

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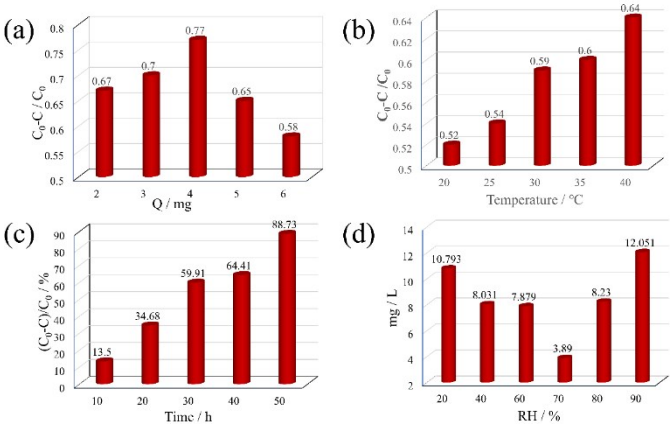


Fig.S1 Effects of TiO_2 dosage (a) and temperature on the solid-phase (b); Degradation of IMD under natural light (c) and the TOC (d).

Table S1. The absorb of water on the TiO_2 surface at the different RH.

RH/%	TiO_2/ mg	RH_2O/ %	H_2O/ mg
20	8.53	1.34	0.1143
40	8.63	1.33	0.1147
60	7.30	1.63	0.1189
70	8.22	1.48	0.1216
90	8.71	2.95	0.2569

The absorb of water on the TiO_2 surface include physisorption and chemisorption. The former was easier to lose than the latter. We believed that physically adsorbed water was lost at the beginning, and chemically adsorptive water molecules are hard to lose by forming hydrogen bonds. Table S1 showed the water molecular weight adsorbed on the surface of TiO_2 at different humidity levels. The adsorption of moisture on the surface of TiO_2 increased sharply due to the physical adsorption behaviour existed at 90% RH, it is likely to form a water layer.

Atmospheric conditions are critical for in-situ photocatalytic solid-phase degradation of IMD. Fig.S2 shows the degradation of IMD in Ar, O_2 and atmosphere. Among them, superoxide radicals were formed by O_2 to accelerate the reaction. In the absence of oxygen in the Ar system, the degradation efficiency decreased significantly.

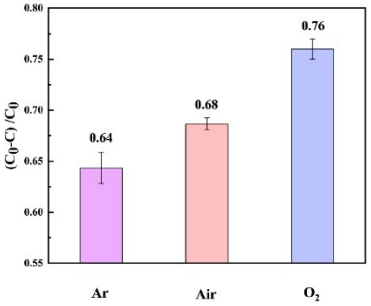
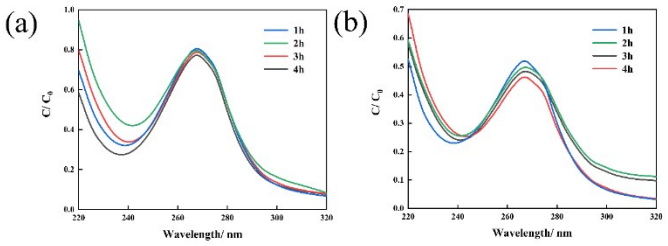


Fig.S2 Degradation efficiency of IMD under different gas conditions.

The adsorption behaviour in photocatalytic reactions usually was carried out in aqueous solution. As can be seen Fig.S3(a), the concentration of IMD hardly decreased with the increase of time. We believe that the adsorption rarely occurs on the solid surface. The photodegradation of IMD was showed in Fig.S3(b), the degradation efficiency was 6% (1 h). So, we should exclude photodegradation when conducting experiments.



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Electronic Supplementary Information (ESI) available: [details of any supplementary information available should be included here]. See DOI: 10.1039/x0xx00000x

Fig.S3 the adsorption capacity of TiO_2 on the solid-phase surface (a). The photodegradation of IMD (b).