

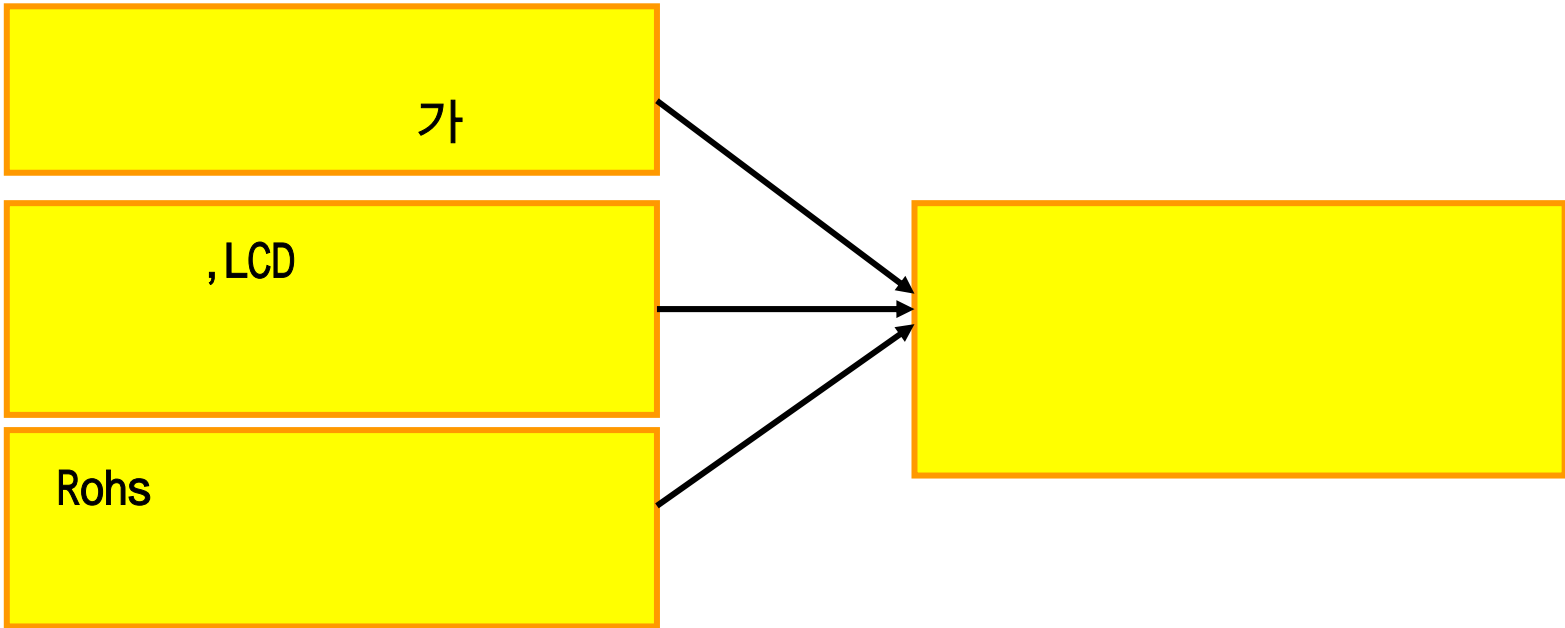


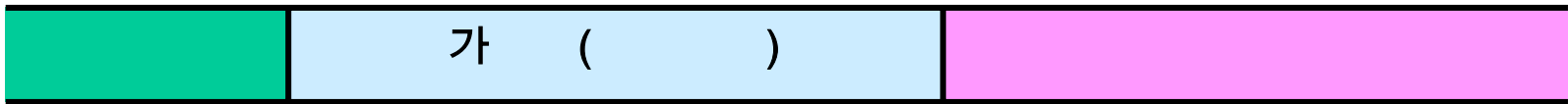
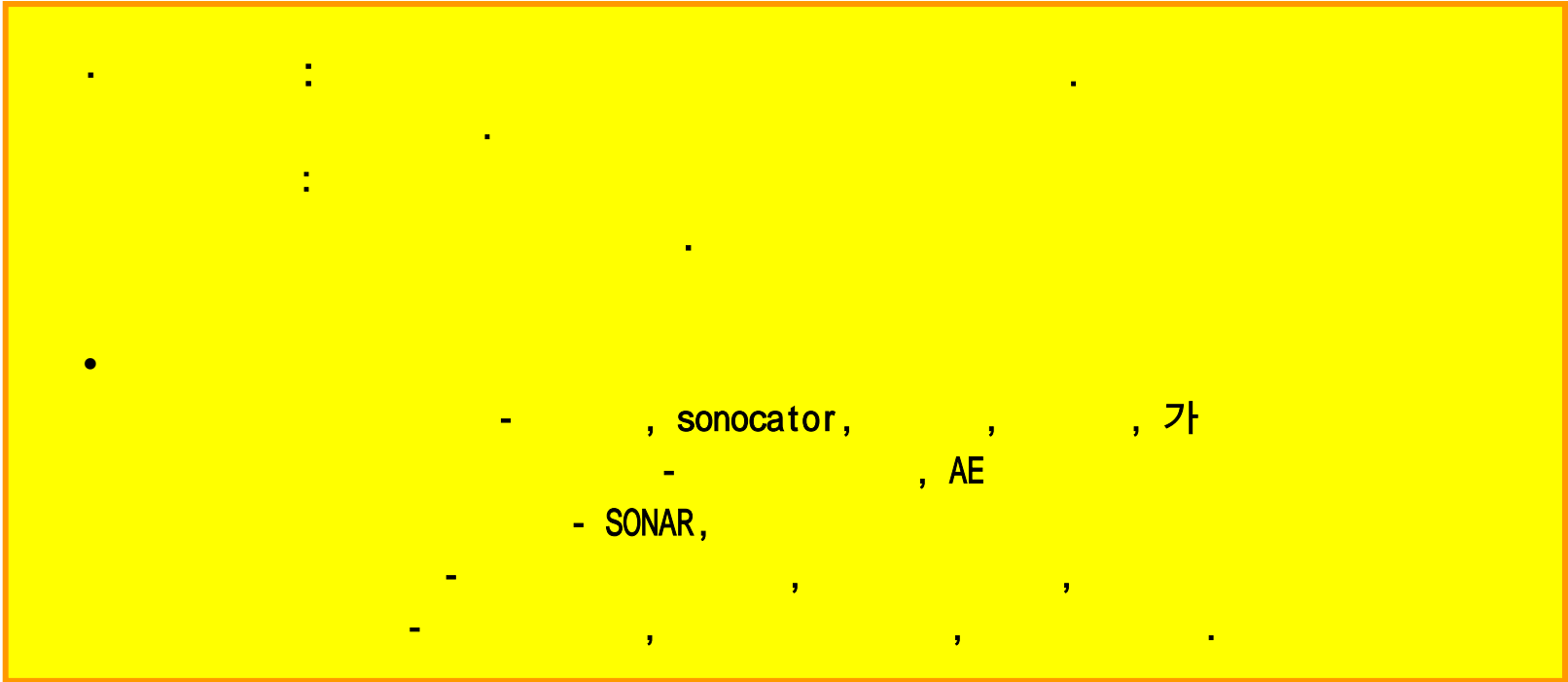


-
-
-

-
- One Bath system
- LCD in line type
- CO²

-
-
-
- IPA





20Hz

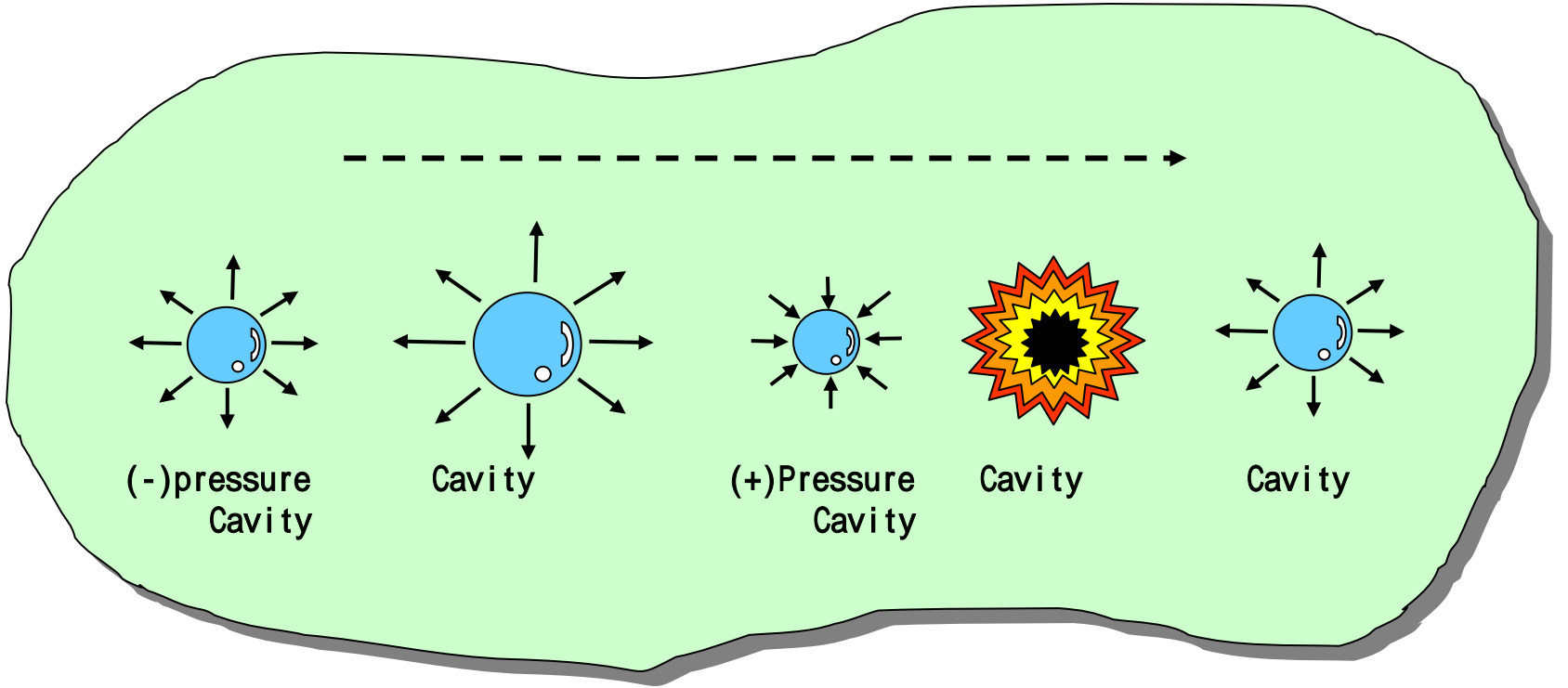
15KHz



가



- 가
-
-
-
-



(-)pressure
Cavity

Cavity

(+)Pressure
Cavity

Cavity

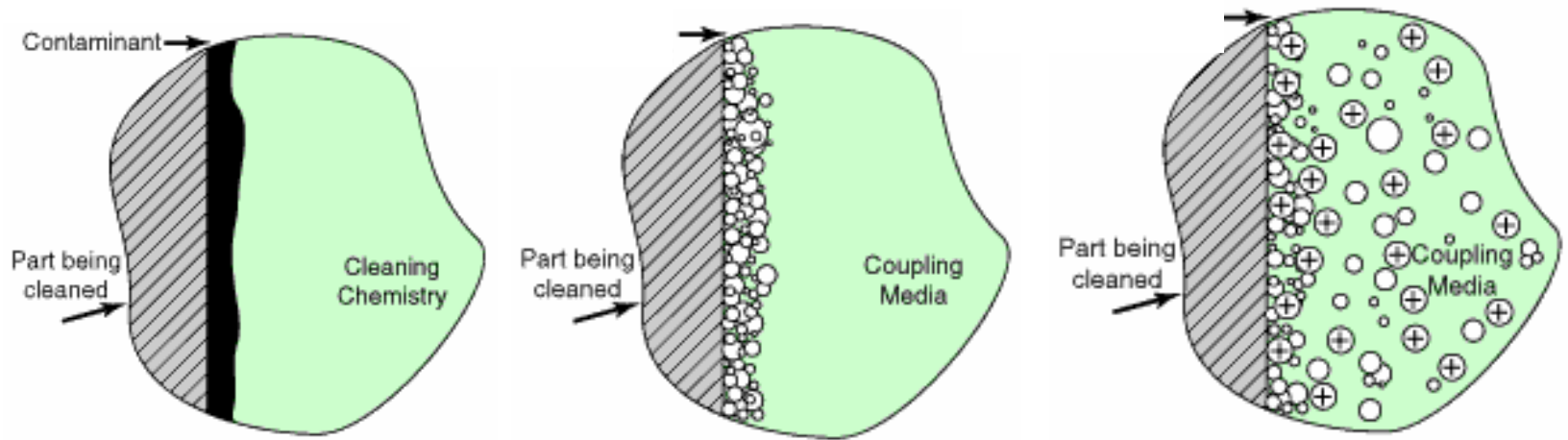
Cavity

가

(+) (-)

Cavity

Mechanism

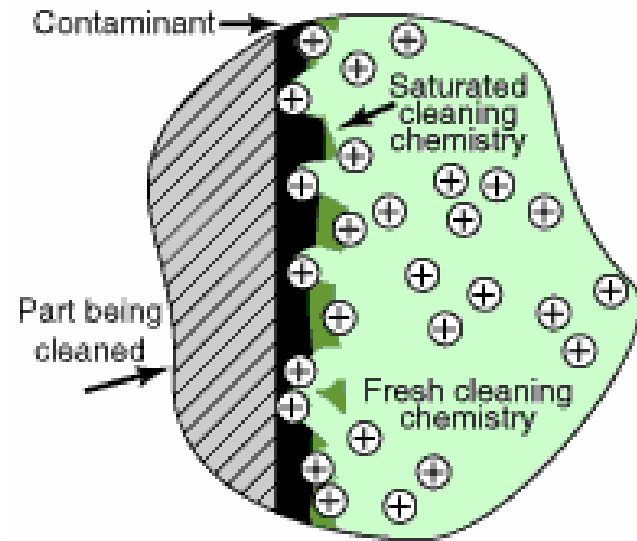
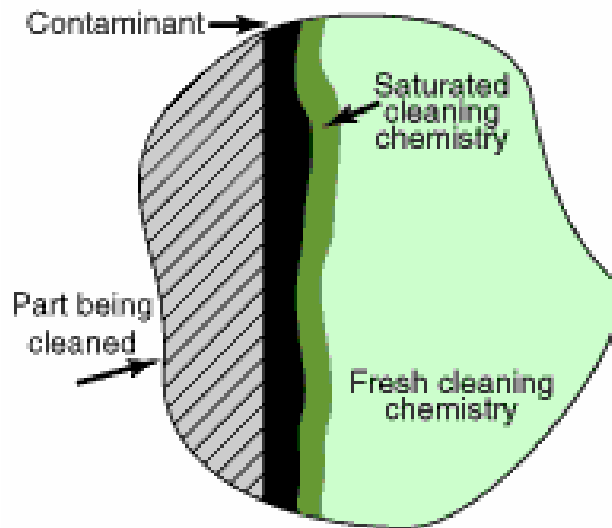


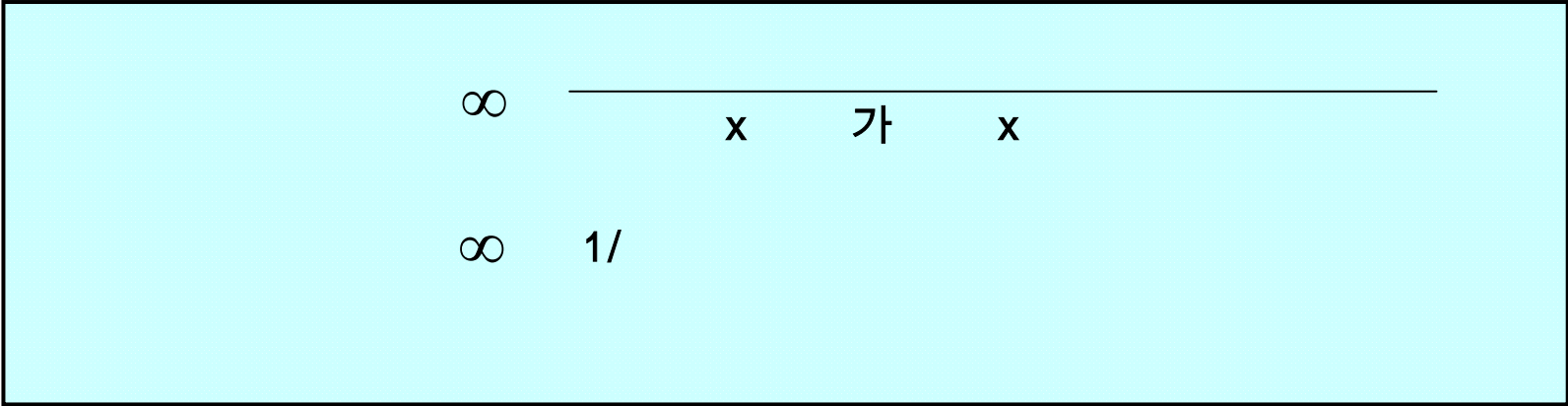
Cavitation

Mechanism

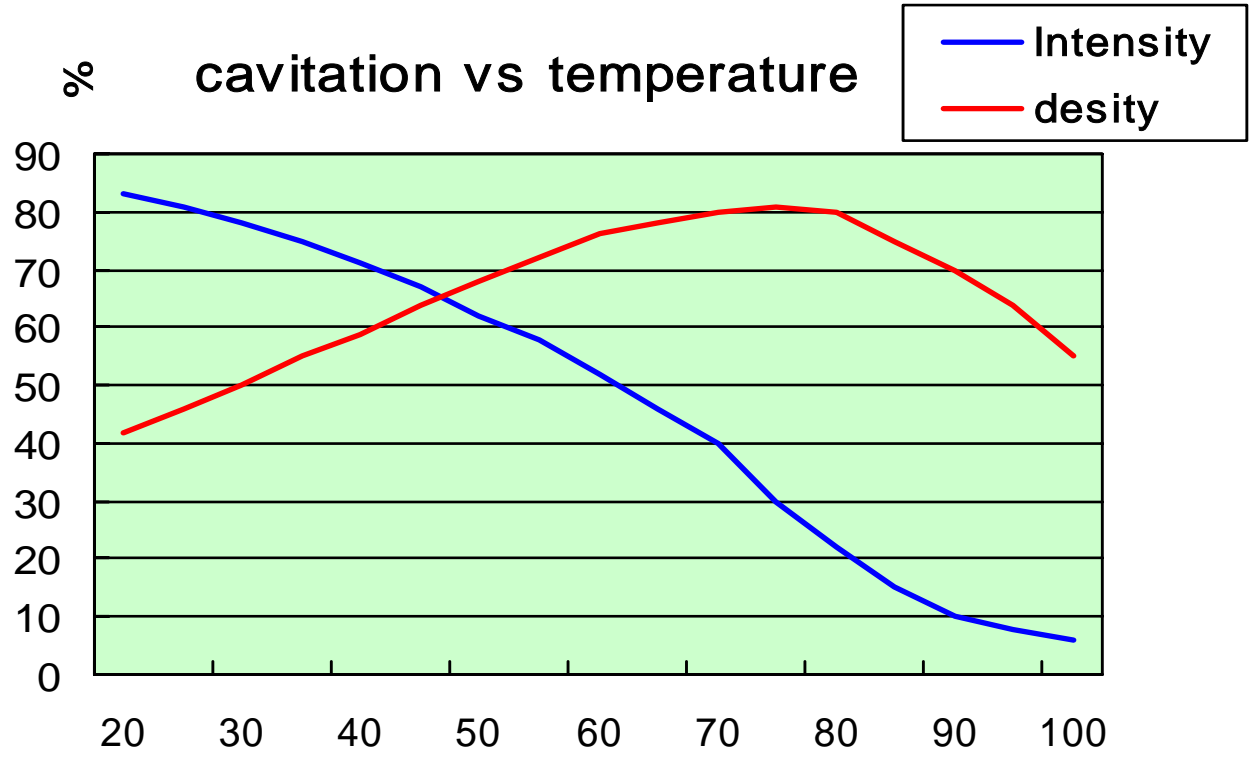
-

synergy





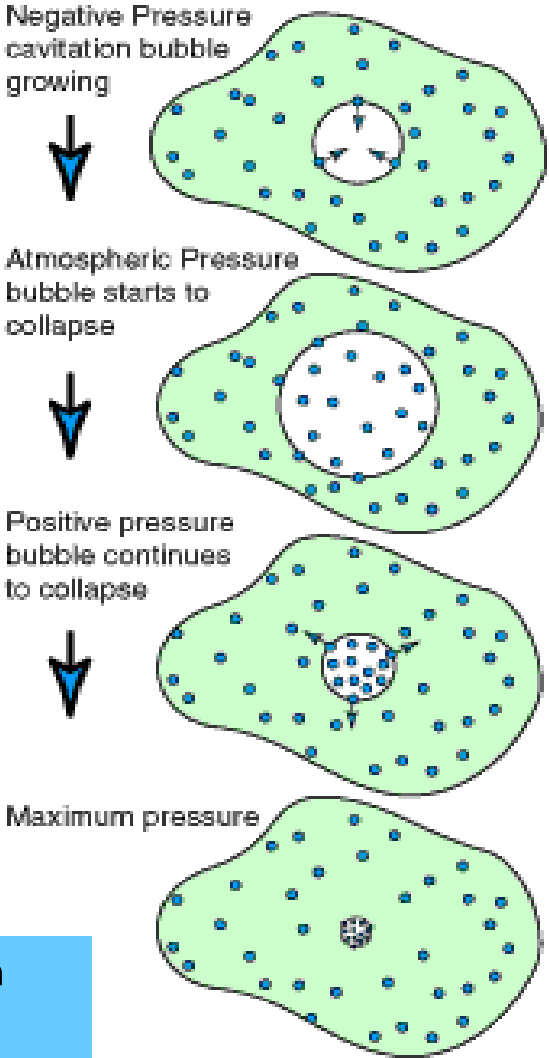
- (Cavitation) : , 가 , ,
- 가
- 가



가
가
40 60 가

가

- 가
- 가



가 cavitation
intensity Mechanism

8ppm DO ()

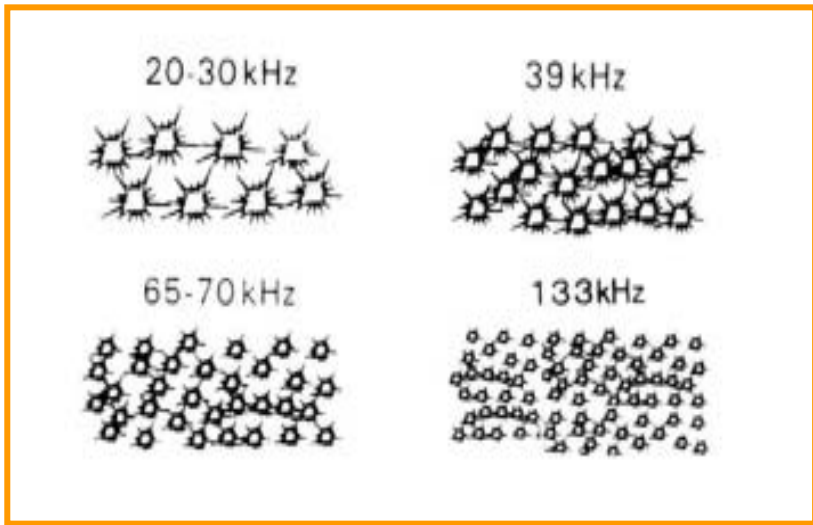
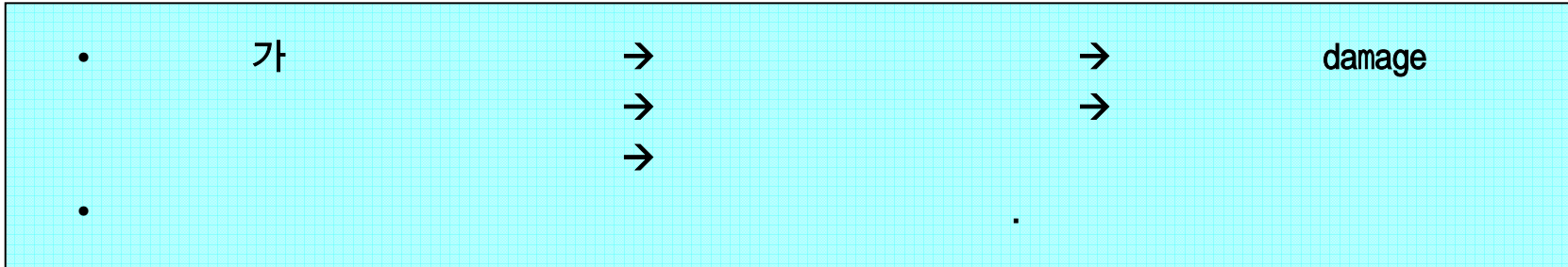


0.5ppm DO ()

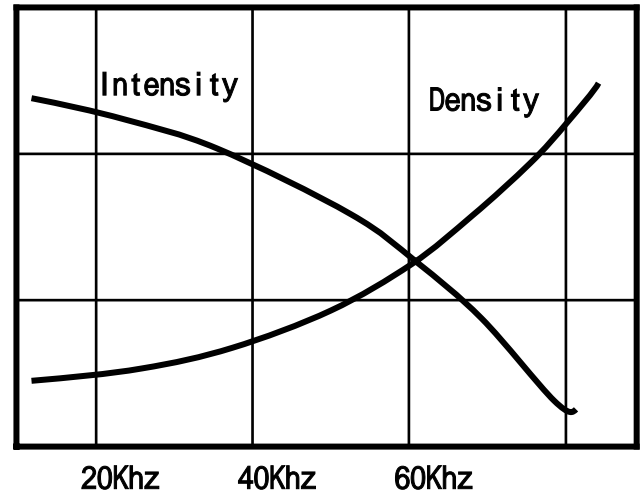
5 가

가

- : 가
-
- 가 ,
- 가 chemical



cavity

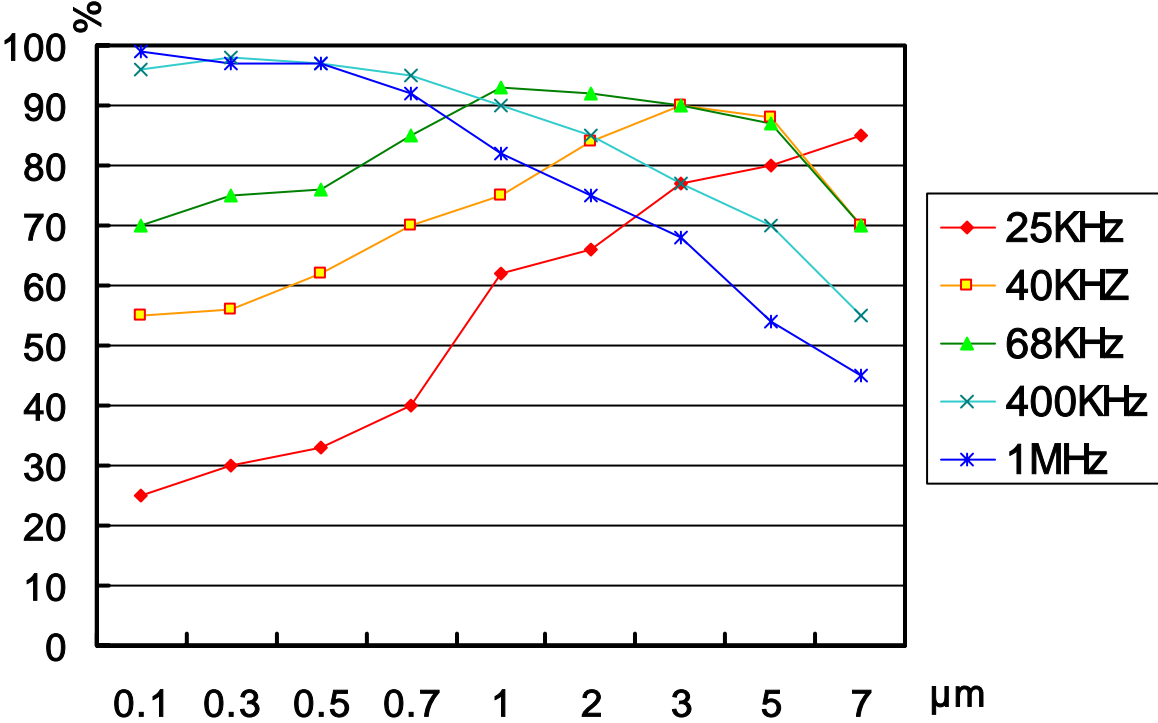


cavity



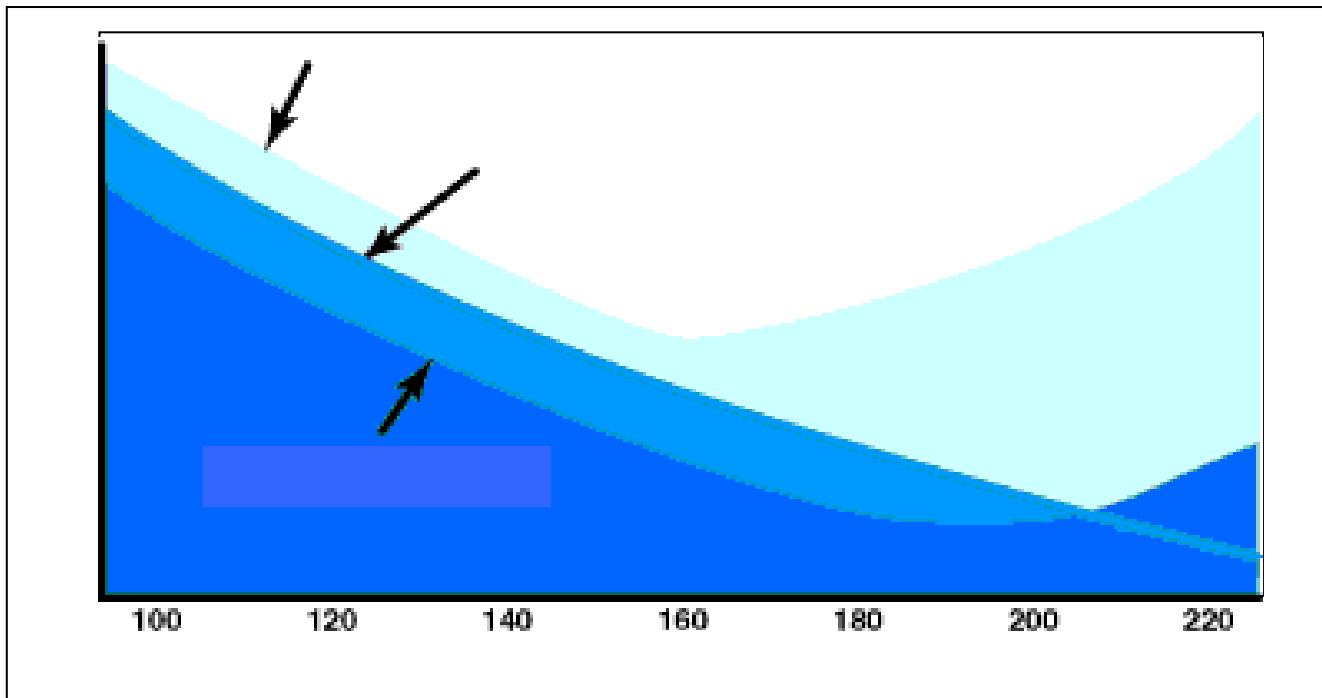
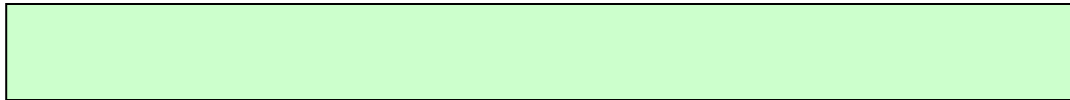
	(28KHz)	(40KHz)	(40 90KHz)	(60 200KHz)	가
				가 ' 가	가
가	1500G	2500G	2500 5000G	5000G	100000G
가	3 μm	2 μm	1.5 μm	1 μm	0.1 μm

Particle



(surface tension) Cavitation

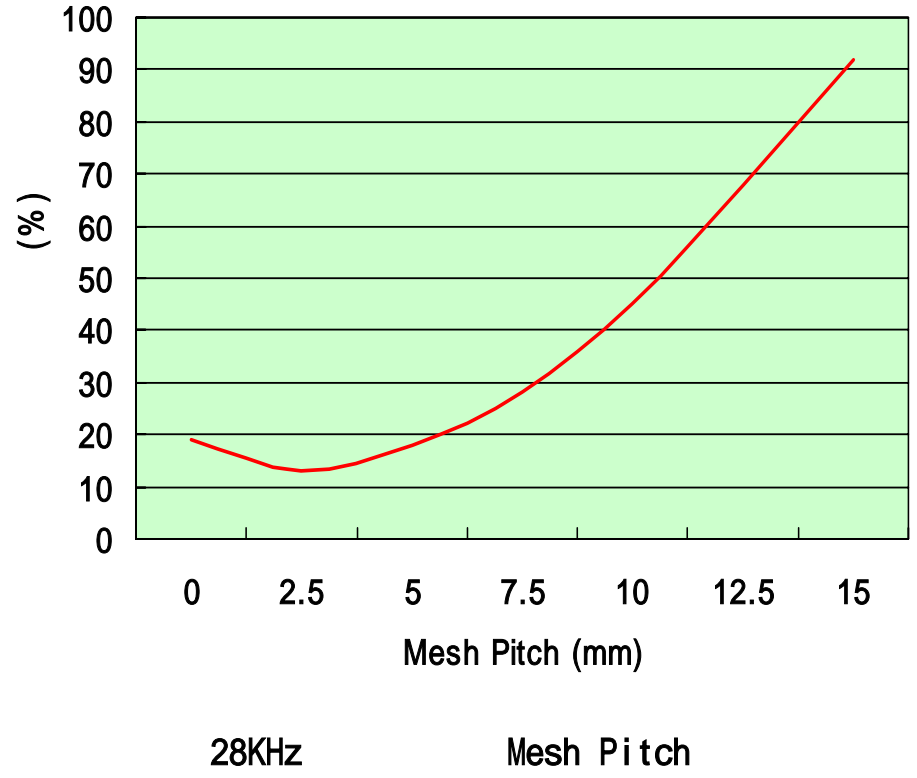
- → → damage
- → →
- → → 가
- 1.1.1-TCE, CFC-113 → 가
- → , .
- → point .



가 가



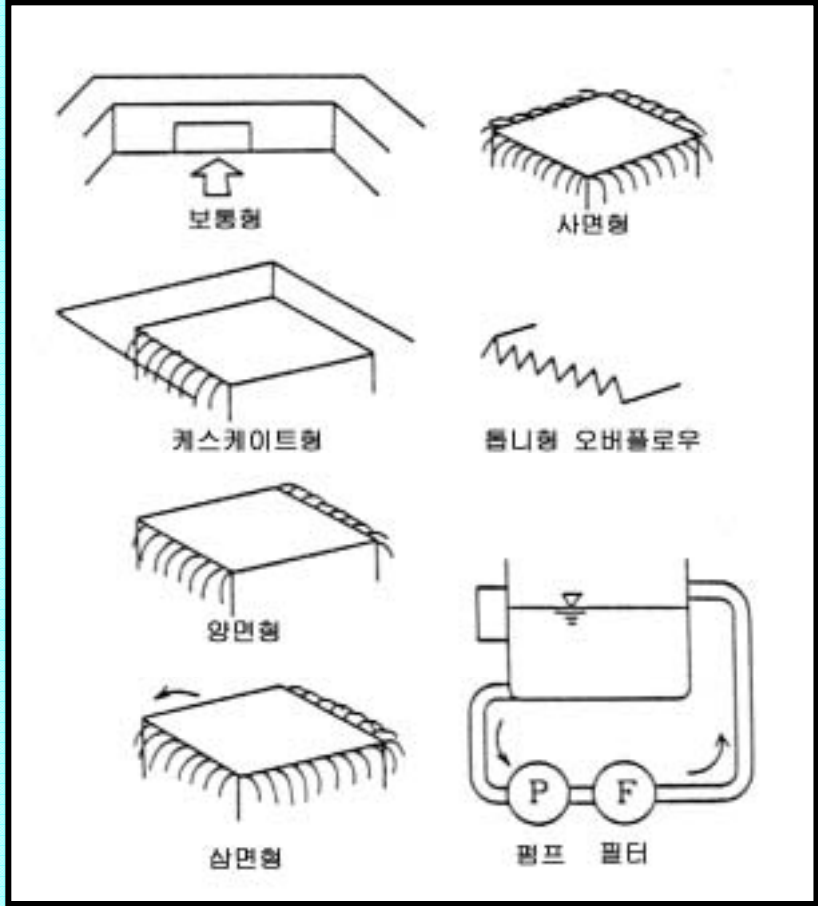
- (Air pocket)
- 가
- 가
- 28KHz 10mm
- 40KHz 7mm
- 가
- :
- 가



OVERFLOW

1 (CERST) 30%
50%

OVERFLOW



Overflow



- 2000 3000 가
- 가
- 가 ,
-
-
- - SUS316L SUS304 20 50mm .
- .



20KHz 40KHz

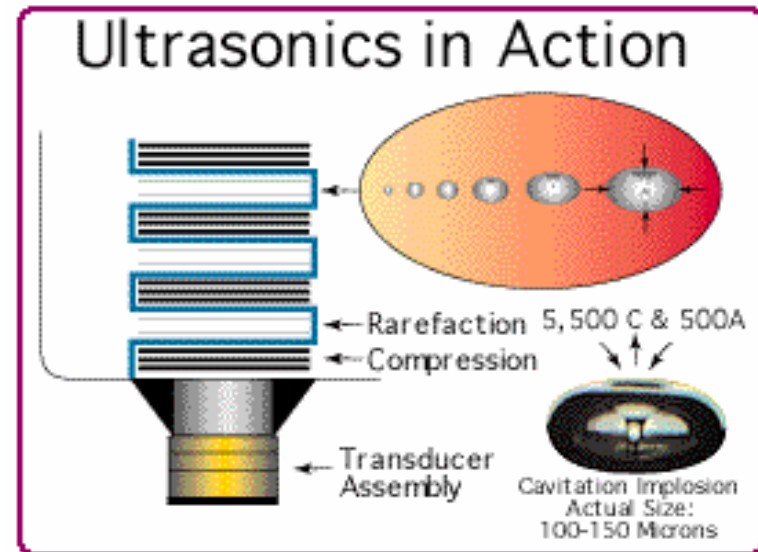
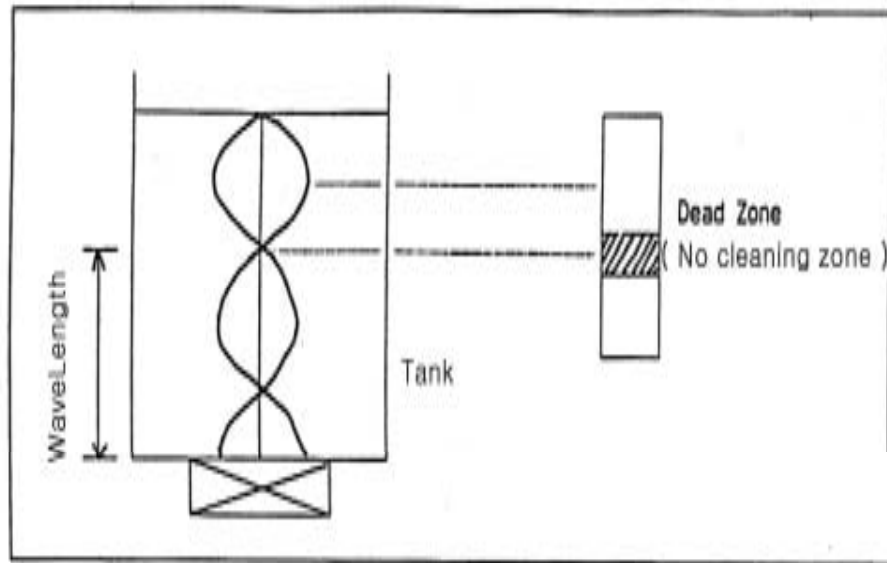
- 가
-
-
-

- 가 .
- .
-
- 가 → _____
-

(Standing wave Problem)

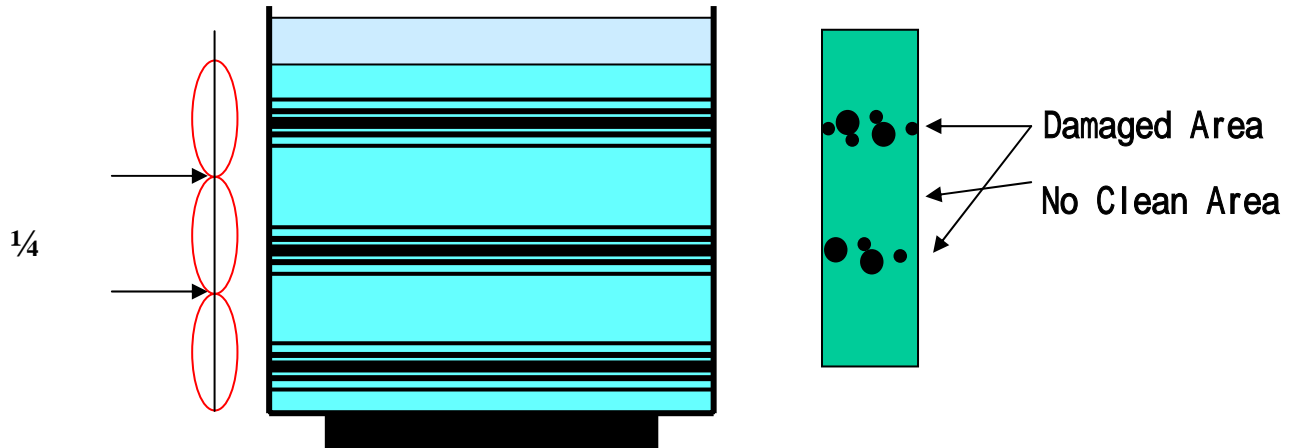
-
-
- $\frac{1}{4}$

가

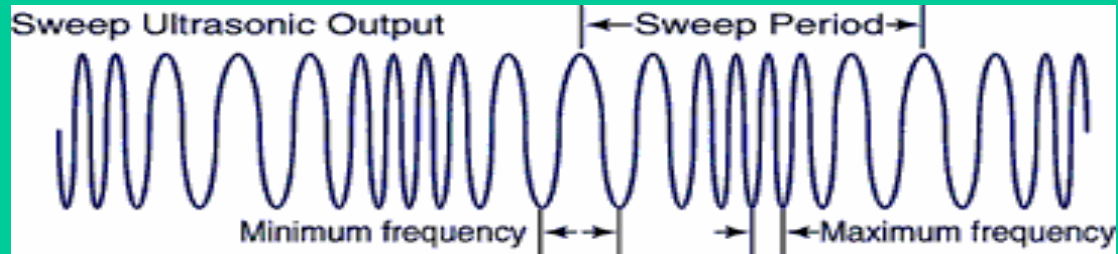
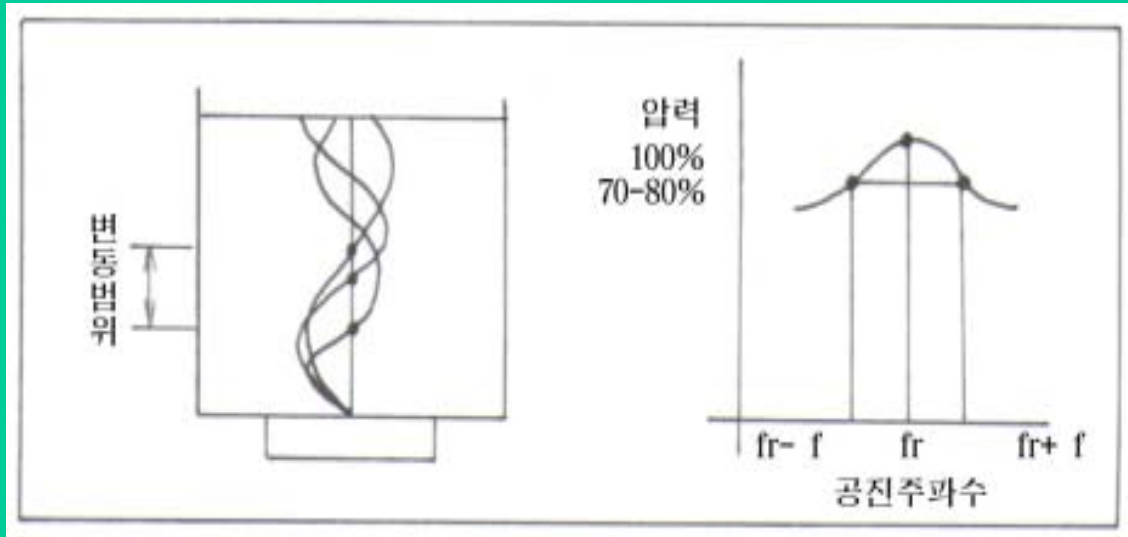


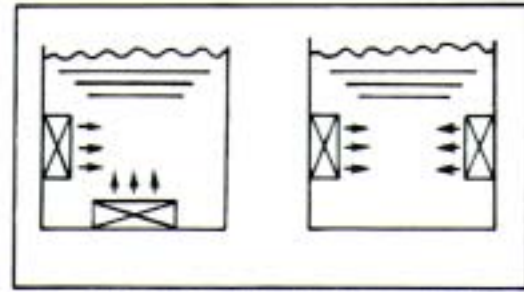
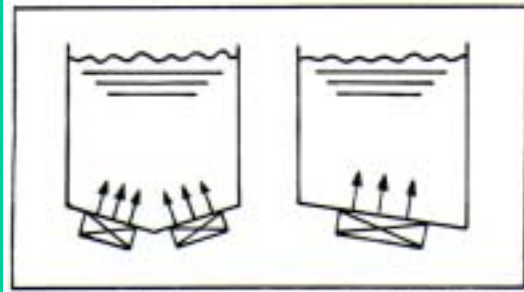
(Standing wave Problem)

•
•
caviataion $\frac{1}{4}$ 가
•
•
→ bath
→
→

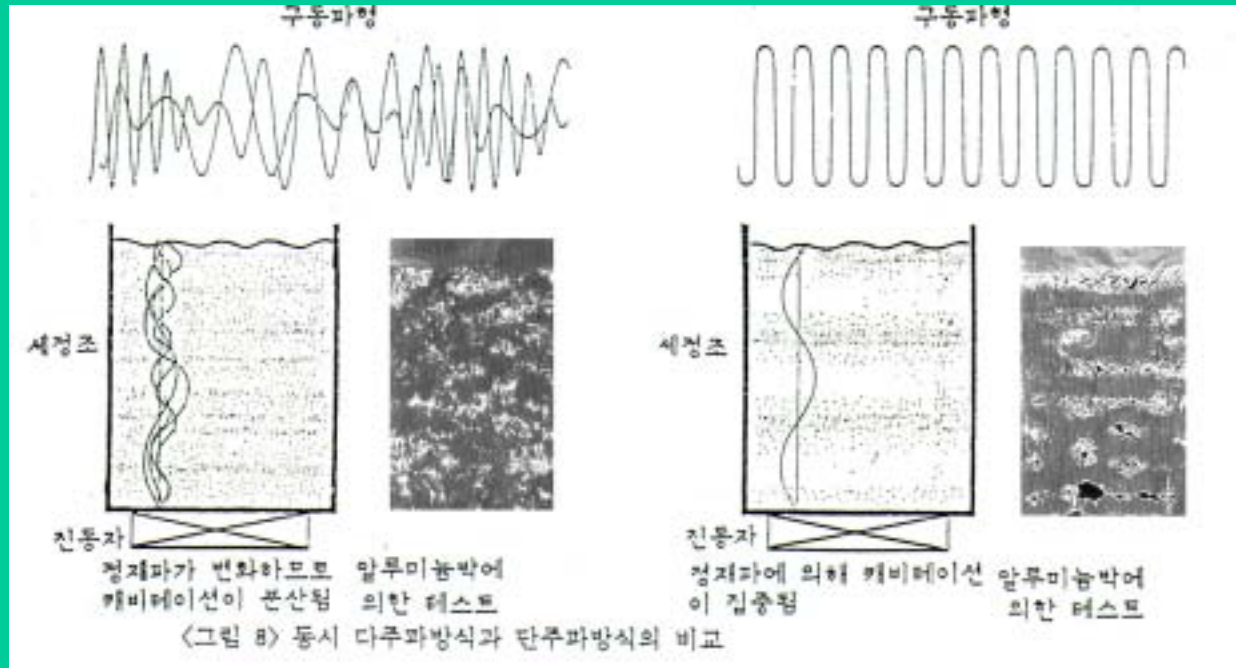


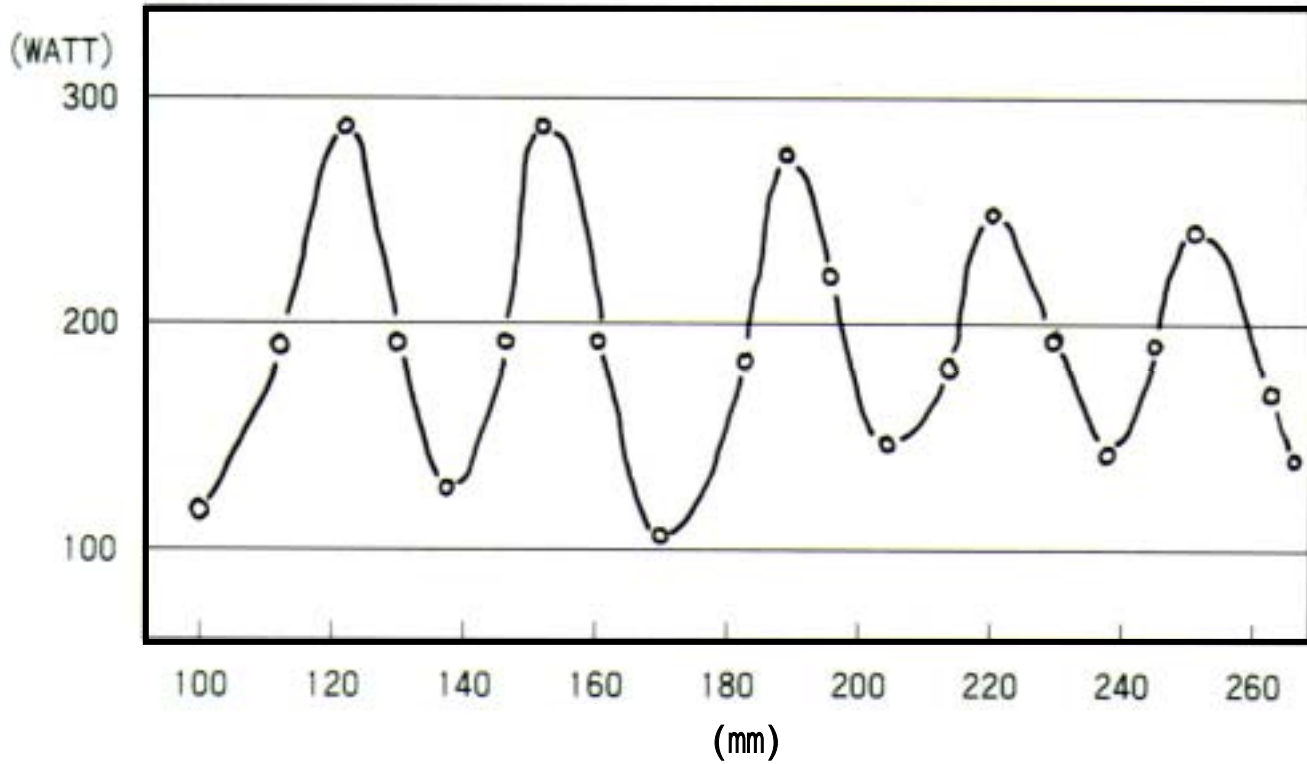
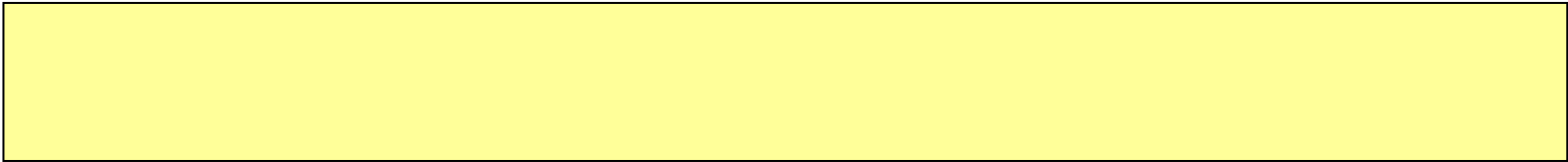
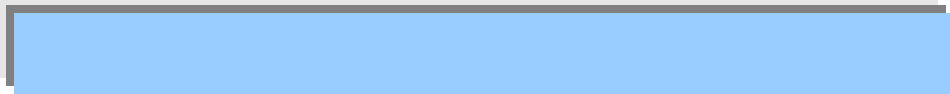
sweep





Bath







가 2 가 .

(multiple frequency)
; 2

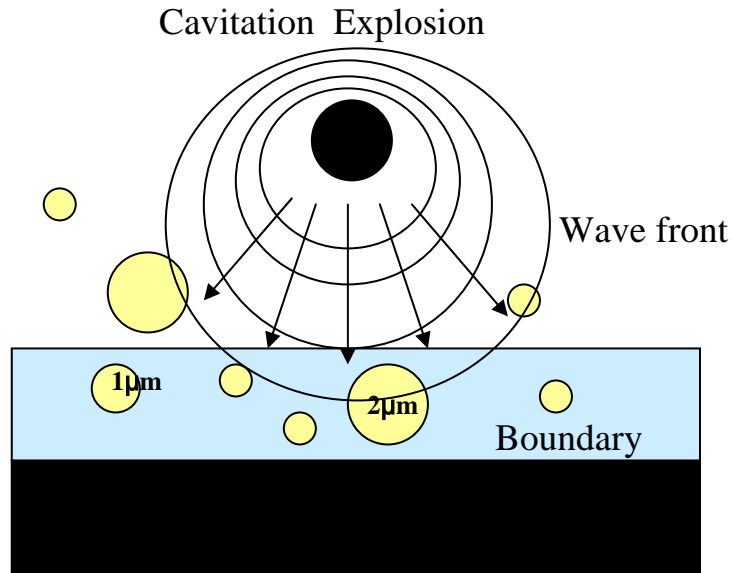


가 가 .
.
.
.

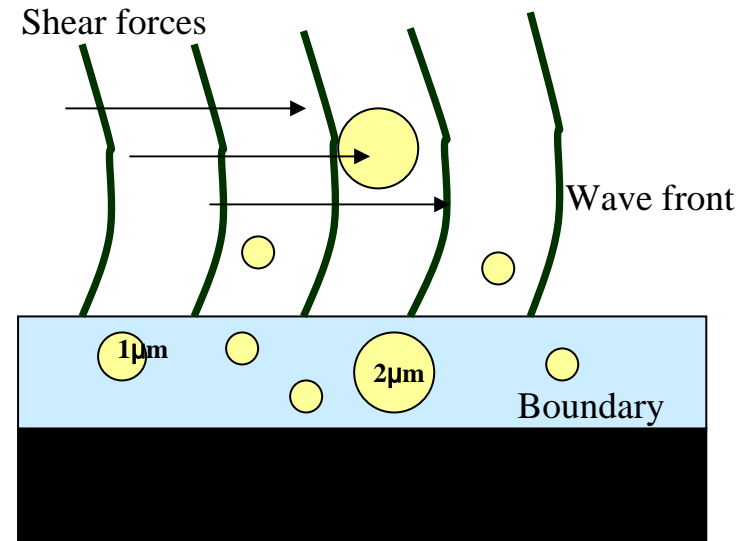
(Simultaneous multi-frequency)
;



가 가 .
.
.
.
.



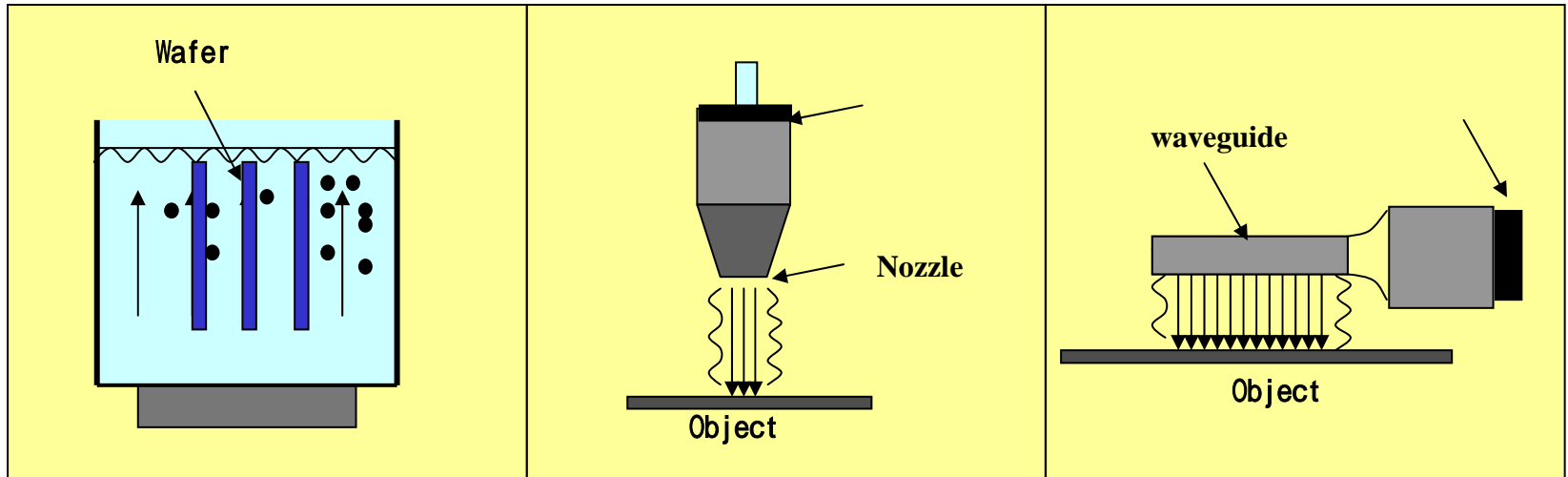
Mechanism



Megasonic

Mechanism

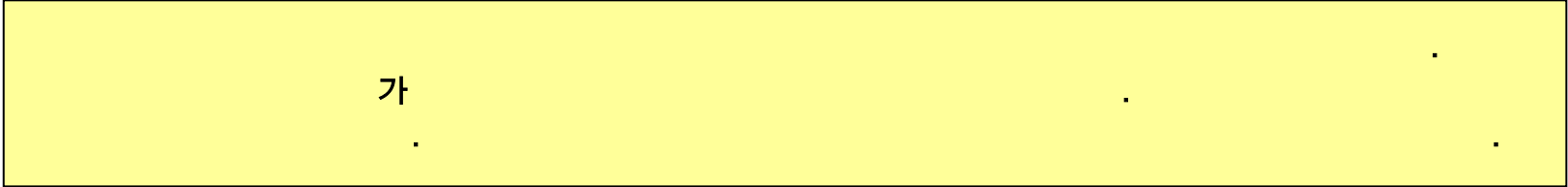
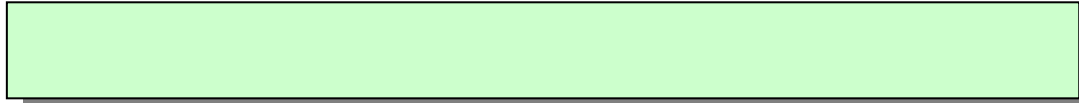
Megasonic



Dipping Type

Spray nozzle Type

Waveguide Type



Dipping



40KHz



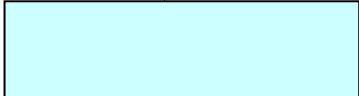
170KHz



1MHz



1MHz





일반 초음파세정

문제점

- 에어포켓의 발생
- 액중 용존기스가 많음

↓

초음파 약함

공기 잔류

U S

진공초음파세정의 장점

- 진공에 의해 에어포켓의 제거
- 용존기스제거 효과

↓

강력초음파 정밀세정

진공펄스세정
진공과 대기압을 반복함으로써 세정효과를 극대화

대기압

진공

0 시작 종료

① ② ③ ④ ⑤

① 피세척물투입
에어포켓 생성

② 진공·탈기
에어포켓제거
용존기스제거

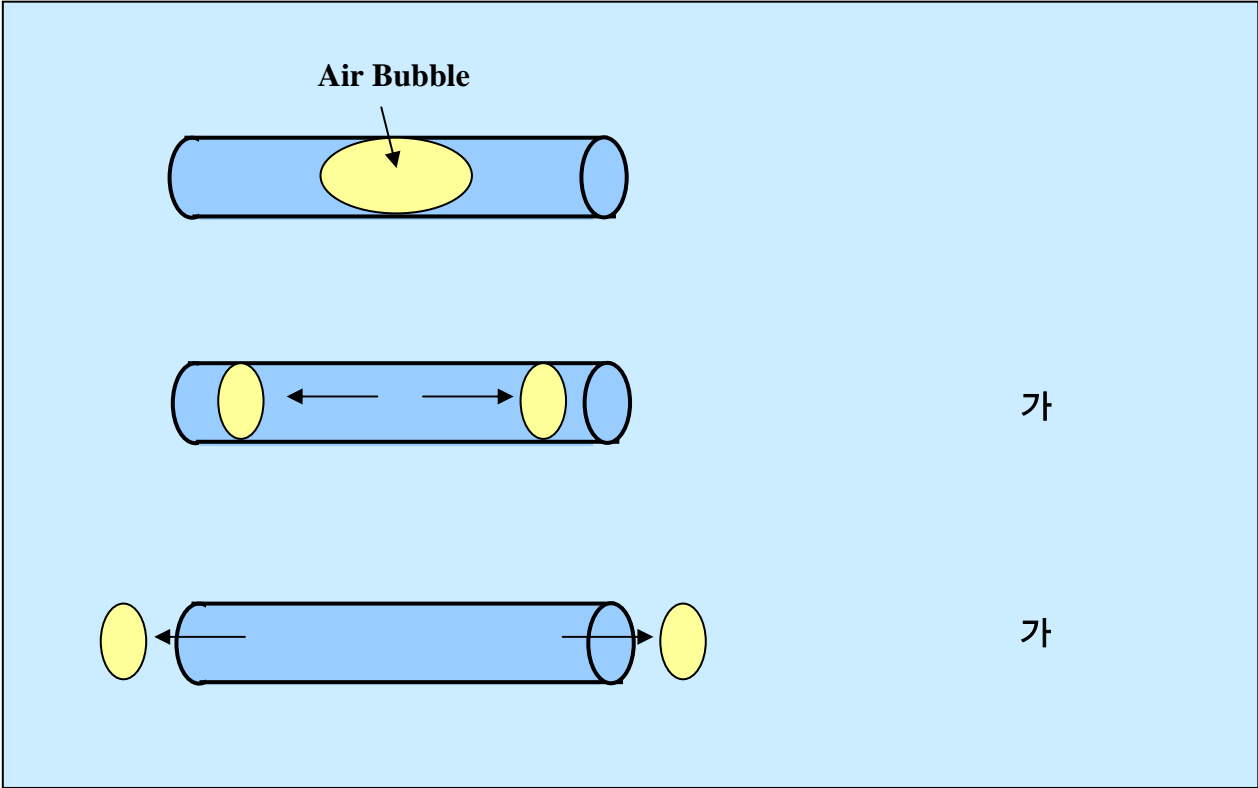
③ 대기압
미세구조 액침투

④ 강력초음파세정
탈기효과에 의한
강력 캐비테이션

⑤ 피세척물꺼냄

1

, , BLU



, Glass plate

